UNIVERSITY OF MUMBAI , MUMBAI

Syllabus for the

M.C.A. (SECOND AND THIRD YEAR)

(MASTER OF COMPUTER APPLICATION)

(As per Credit Based Semester and Grading System With effect from 2013-2014)

Program Structure for
Master in Computer Application (MCA)
University of Mumbai, Mumbai
(With Effect from 2012-2013)

MCA Second Year Syllabus Scheme

Semester III

Subject Code	Subject Name	Teaching Scheme (Contact Hours)			Credits Assigned			
		Theory	Pract.	Tut.	Theory	Pract.	Tut.	Total
MCA301	Database management System	04	--	--	04	--	--	04
MCA302	Computer Graphics	04	--	--	04	--	--	04
MCA303	Network security	04	--	--	04	--	--	04
MCA304	Operation Research	04	--	--	04	--	--	04
MCA305	Software Project Management	04	--	--	04	--	--	04
L301	Laboratory I – Computer Graphics	--	06	--	--	03	--	03
L302	Laboratory II – DBMS + Software Testing	--	06	--	--	03	--	03
PR301	MINI PROJECT	--	--	--	--	--	--	02
Total		**20**	**12**	**--**	**20**	**06**	**--**	**28**

Subject Code	Subject Name	Examination Scheme						
		Theory				Term Work	Pract.	Oral /Project Presentation
		Internal Assessment			End Sem. Exam.			
		Test1	Test 2	Avg.				
MCA301	Database management System	20	20	20	80	--	--	--
MCA302	Computer Graphics	20	20	20	80	--	--	--
MCA303	Network security	20	20	20	80	--	--	--
MCA304	Operation Research	20	20	20	80	--	--	--
MCA305	Software Project Management	20	20	20	80	--	--	--
L301	Laboratory I – Computer Graphics	--	--	--	--	25	50	25
L302	Laboratory II – DBMS + Software Testing	--	--	--	--	25	50	25
PR301	MINI PROJECT	--	--	--	--	--	--	50
Total				**100**	**400**	**50**	**100**	**100**
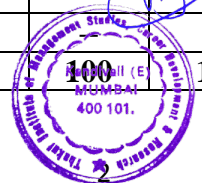
Semester IV

Subject Code	Subject Name	Teaching Scheme (Contact Hours)			Credits Assigned			
		Theory	Pract.	Tut.	Theory	Pract.	Tut.	Total
MCA401	Core & Advanced JAVA	04	--	--	04	--	--	04
MCA402	Advanced Database Theory and Applications	04	--	--	04	--	--	04
MCA403	System Modeling and Simulation	04	--	--	04	--	--	04
MCA404	Soft skill development	04	--	--	04	--	--	04
Elective I (SELECT ANY ONE) MCA4051 GIS MCA4052 Embedded Systems MCA4053 SOA MCA4054 E Business MCA4055 Human Computer Interface		04	--	--	04	--	--	04
L401	Lab I - Core & Advanced JAVA	--	06	--	--	03	--	03
L402	Lab II-ADTA + UML	--	06	--	--	03	--	03
Total		**20**	**12**	**--**	**20**	**06**	**--**	**26**

Subject Code	Subject Name	Examination Scheme						
		Theory				Term Work	Pract.	Oral
		Internal Assessment			End Sem. Exam.			
		Test1	Test 2	Avg.				
MCA401	Core & Advanced JAVA	20	20	20	80	--	--	--
MCA402	Advanced Database Theory and Applications	20	20	20	80	--	--	--
MCA403	System Modeling and Simulation	20	20	20	80	--	--	--
MCA404	Soft skill development	20	20	20	80	--	--	--
Elective I (SELECT ANY ONE) MCA4051 GIS MCA4052 Embedded Systems MCA4053 SOA MCA4054 E Business MCA4055 Human Computer Interface		20	20	20	80	--	--	--
L401	Lab I- Core & Advanced JAVA	--	--	--	--	25	50	25
L402	Lab II-ADTA + UML	--	--	--	--	25	50	25
Total				**100**	**400**	**50**	**100**	**50**

MCA Third Year Syllabus Scheme

Semester V

Subject Code	Subject Name	Teaching Scheme (Contact Hours)			Credits Assigned			
		Theory	Pract.	Tut.	Theory	Pract.	Tut.	Total
MCA501	Advanced web technology & Dot Net	04	--	--	04	--	--	04
MCA502	Wireless & Mobile Technology	04	--	--	04	--	--	04
MCA503	Soft Computing	04	--	--	04	--	--	04
MCA504	Distributed computing and Cloud Computing	04	--	--	04	--	--	04
Elective II (SELECT ANY ONE) MCA5051 Cyber Security MCA5052 Multimedia Technology MCA5053 Information System security and Audit MCA5054 Bioinformatics MCA5055 Software Quality Assurance		04	--	--	04	--	--	04
L501	Lab I-AWT + Dot Net	--	06	--	--	03	--	03
L502	Lab II- Wireless & Mobile Technology + Mini project	--	06	--	--	03	--	03
PR501	MINI PROJECT	--	--	--	--	--	--	02
		20	**12**	**--**	**20**	**06**	**--**	**28**

Subject Code	Subject Name	Examination Scheme						
		Theory				Term Work	Pract.	Oral
		Internal Assessment			End Sem. Exam.			
		Test1	Test 2	Avg.				
MCA501	Advanced web technology & Dot Net	20	20	20	80	--	--	--
MCA502	Wireless & Mobile Technology	20	20	20	80	--	--	--
MCA503	Soft Computing	20	20	20	80	--	--	--
MCA504	Distributed computing and Cloud Computing	20	20	20	80	--	--	--
Elective II (SELECT ANY ONE) MCA5051 Cyber Security MCA5052 Multimedia Technology MCA5053 Information System security and Audit MCA5054 Bioinformatics MCA5055 Software Quality Assurance		20	20	20	80	--	--	--

L501	Lab I-AWT + Dot Net	--	--	--	--	25	50	25
L502	Lab II- Wireless & Mobile Technology + Mini Project	--	--	--	--	25	50	25
PR501	MINI PROJECT	--	--	--	--	--	--	50
Total				**100**	**400**	**50**	**100**	**50**

Semester VI

Subject Code	Subject Name	Teaching Scheme (Contact Hours)	Credits Assigned	
		Intermediate Presentations	Project	Total
MCA601	INTERNSHIP - Project	30	15	15
MCA602	Seminar	5	--	1

Subject Code	Subject Name	Examination Scheme				
		Theory				
		Internal Assessment			End Sem. Exam.	Total
		Presentation1	Presentation2	Total		
MCA601	INTERNSHIP - Project	25	25	50	100	150
MCA602	Seminar	---	---	---	50	50
Total		25	25	50	**150**	**200**

5

MCA

Semester III

Syllabus

Subject Code	Subject Name	Teaching Scheme (Contact Hours per week)			Credits Assigned			
MCA301		Database Management System						
		Theory	Pract	Tut	Theory	Pract	Tut	Total
MCA301	Database Management System	04	--	--	04	--	--	04
Examination Scheme								
Theory					Term Work	Pract	Oral	Total
Internal Assessment			End Sem. Exam. [Once in a semester]					
Test 1	Test 2	Average						
20	20	20	80		--	--	--	100

Objectives	The major objective of this subject is to provide a strong foundation in database concepts, technology and practice to the students to groom them into well-informed database application developers. The subject will emphasis on basic concepts, how to organize, maintain and retrieve--efficiently, and effectively--information from a DBMS.	
Outcomes	The students will be able to understand, appreciate and effectively explain the underlying concepts of database technologies. Design and implement a database schema for a given problem-domain, Normalize a database, Populate and query a database using SQL DML/DDL commands, Declare and enforce integrity constraints on a database, Worked successfully in a team by design and development of a database application system.	
Unit No.	**Contents**	**No. of Hrs.**
Unit I	**Overview:** Overview of Database management system: Limitation of data processing environment, data independence, three levels of abstraction, data models, DBMS Architecture, people who with database, overview of conventional data models-Hierarchical, and Network models. Codd's Rule, DBMS v/s RDBMS, Types Of databases.	4Hrs
Unit II	**Entity Relation Model:** Entity, attributes, keys, relation. Cardinality, participation. Weak entities, ER Diagram Generalization Specialization and aggregation. Conceptual design with ER model. Entity v/s attributes. Entity v/s Relationship, Binary v/s ternary relationship. Aggregate v/s ternary relationship. **Studies –ER Diagram**	7 Hrs
Unit III	**Relational Model**: Introduction to relational model, Integrity Constraints over relation. Logical database design: ER to relational	2 Hrs
Unit IV	**Overview of Storage and Indexing:** Storage hierarchies, Tree structured indexing and hash based indexing.	6 Hrs
Unit V	**Schema refinement and Normal Forms:** Functional dependencies, first, second, third, fourth and fifth normal form, BCNF, Comparison of 3NF and BCNF Lossless and dependency preserving decomposition, closure of dependencies, minimal closure	8 Hrs
Unit VI	**Query Evaluation Overview:** Overview of query optimization, Measures of query cost, Evaluation of query, Query evaluation plans, relational optimization.	3 Hrs
Unit VII	**Transaction processing:** Transaction concurrency control recovery of Transaction failure, Serilazibility, locking techniques. Granularity in locks. Time stamping techniques, two phase locking system, deadlock handling	8 Hrs
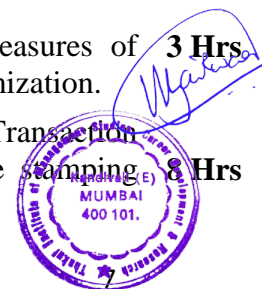
Recovery, Types Of failure, Techniques of Recoverability

Unit VIII **Security and Authorization:** Introduction to database security, Issues, Control **4 Hrs**
     Measure, Grant and revoke. Permissions Access Control-Discretionary, Manadatory, Bell La Pedula Model, Audit Trail, Challenges in database security

Unit IX **Case Study: One database application development (Oracle\SQL Server)** **3 Hrs**

Reference Books:
1. Korth, Silberchatz, Sudarshan, "Databse system Concepts", McGraw Hill ,2006
2. RiniChakarabarti and ShilbhadraDasgupta, ,"Advanced Database Management System ", Dreamtech,2011
3. C. J. Date ,"An Introduction to Database Systems", 8/e,Pearson Education,2002
4. Rob Coronel ,"Database Systems Design, Implementation and Management", Cengage Publication,2009
5. Raghu Ramakrishnan, Johannes Gehrke ,"Database Management Systems", Third Edition, McGraw Hill ,2003
6. Mark Gillenson ,"Fundamental of Database System" ,Wiley Publication,2011
7. Elmasari and Navathe, Benjamin Cummins ,"Fundamental of Database System", Pearson Education ,2009
8. Murach,"Murach's Oracle SQL and PL/SQL" ,SPD,2012
9. P.S Deshpande ,"SQL & Pl\SQL for Oracle 11g Black Book",Dreamtech,2011
10. Sharnam Shah ,Vaishali Shah ,"Oracle for professionals" ,SPD,2011

Subject Code	Subject Name	MCA302	Computer Graphics					

Subject Code	Subject Name	Teaching Scheme (Contact Hours per week)			Credits Assigned			
		Theory	Pract	Tut	Theory	Pract	Tut	Total
MCA302	**Computer Graphics**	**04**	--	--	**04**	--	--	**04**

Examination Scheme								
Theory					**Term Work**	**Pract**	**Oral**	**Total**
Internal Assessment			**End Sem. Exam.** **[Once in a semester]**					
Test 1	**Test 2**	**Average**						
20	**20**	**20**	**80**		--	--	--	**100**

Objectives Through this course students are introduced to fundamental principles and algorithms underlying computer graphics, including line drawing algorithms, circle/ellipse drawing algorithms, 2D geometrical transformation, 3D geometric transformations, viewing in 3D (orthographic projection and perspective projection), visible surface detection algorithms. They are also introduced to different image enhancement techniques.

Outcomes After completion of this course students are expected to know how to a rasterize line, circle etc. and implement 2D-3D transformations such as translation, rotation, scaling, shearing, and reflection. They are also expected to understand and be able use them to implement them in animation. They are expected to know how to apply different image transformation on an image.

Unit No.	Contents	No of. Hrs
Unit I	**Introduction:** Introduction to computer graphics and Image Processing and their applications, Raster-Scan System, Random-Scan Systems.	2 Hrs
Unit II	**Basic Drawing Algorithms: Line-Drawing Algorithms**: DDA Algorithm, Bresenham's Line Algorithm. **Circle-Generating Algorithms:** Midpoint Circle Algorithm, Bresenham's Circle Algorithm. **Ellipse-Generating Algorithm:** Midpoint Ellipse Algorithm. **Two Dimensional Curve Generation:** Bezier curves and Cubic B-Spline Curves.	6 Hrs
Unit III	**Region Filling Algorithms :**Scan-Line Polygon fill Algorithm, Inside-Outside Tests, Boundary-Fill Algorithm, Flood-fill Algorithm	2 Hrs.
Unit IV	**Two-Dimensional Geometric Transformations:** Translation, Rotation, Scaling, Matrix Representations and Homogeneous Coordinates, Composite Transformations, Inverse transformations, General Pivot-Point Rotation, General Fixed-Point Scaling, Concatenation Properties, General Composite Transformations, Rotation about any arbitrary line. **Other Transformations:** Reflection, Shear.	7 Hrs.
Unit V	**Two-Dimensional Viewing and Clipping:** The Viewing Pipeline, Viewing Coordinate Reference Frame, Window-to viewport Coordinate transformation. **Clipping Operations:** Point Clipping, Line Clipping, Cohen-Sutherland Line Clipping, Liang-Barsky Line Clipping Polygon Clipping, Midpoint subdivision line clipping algorithm, Sutherland-Hodgeman Polygon Clipping.	6 Hrs.

9

Unit VI	**Three-Dimensional Concepts and Object Representation:** Three-dimensional transformations: Translation, Rotation, Scaling, and their Matrix Representations. **Three-Dimensional Display Methods:** Parallel Projection, Perspective Projection and their types. **Three-Dimensional Object Representations:** Octrees.	**5 Hrs.**
Unit VII	**Visible-Surface Detection Methods:** Classification of Visible-Surface Detection Algorithms, Depth-Buffer Method, A-Buffer Method, Scan-Line Method.	**2 Hrs.**
Unit VIII	**Shading Techniques:** Constant intensity shading, Gourd shading, Halftoning and Dithering. **Other Applications Areas: Fractals:** Fractal Geometry methods. Fractal-Generation Procedures, Classification of Fractals, Fractal Dimension, Koch Curve. **Animation:** Introduction to animation.	**2 Hrs.**
Unit IX	**Introduction:** Fundamental Steps in Digital Image Processing: Components of an Image Processing System, Basic Concepts in Sampling and Quantization, Representing Digital Images, Spatial and Gray-Level Resolution.	**2Hrs.**
Unit X	**Image Enhancement in the Spatial Domain: Some Basic Intensity Transformation Functions**: Image Negatives, Log Transformations, and Power-Law Transformations. **Piecewise-Linear Transformation Functions:** Contrast stretching, Gray-level slicing, Bit plane slicing**. Histogram Processing**: Image Histogram and Histogram Equalization, Image Subtraction, and Image Averaging. **Spatial Filtering**: Basics of Spatial Filtering, **Smoothing Spatial Filters** Smoothing Linear Filters, Order-Statistics Filters. **Sharpening Spatial Filters:** Use of Second Derivatives for Enhancement–The Laplacian, **Unsharp masking and High-Boost Filtering**: Use of First Derivatives for (Nonlinear) image sharpening - The Gradient– Robert, Prewitt and Sobel Masks. **Combining Spatial Enhancement Methods.**	**11 Hrs.**

References:
1. AmrendraSinha, ArunUdai, Computer Graphics –Tata McGraw-Hill Education, Pub Date: AUG-07
2. Rajesh K. Maurya- Computer Graphics -- Wiley India Pvt. Limited, 2011
3. Computer Graphics, 1e,Shirley, Cengage Learning
4. Donald Hearn and M Pauline Baker, Computer Graphics C Version -- Computer Graphics, C Version, 2/E, Pearson Education.
5. Rafael C. Gonzalez and Richard E. Woods, Digital Image Processing (3rd Edition), Pearson Education.
6. Roy A. Plastock, Roy A. Plastock- Schaum's Outline of Computer Graphics 2/E
7. Computer Graphics: Principles and Practice in C -- James D. Foley, Andries van Dam, Steven K. Feiner, John F. Hughes, Pearson Education.
8. David F. Rogers, James Alan Adams, Mathematical elements for computer graphics , McGraw-Hill, 1990
9. Peter Shirley, Stephen Robert Marschner-- Fundamentals of Computer Graphics A K Peters, Limited, 3rd ed. 2009.
10. S. Annadurai, R Shanmugalakshmi-Fundamentals of Digital Image Processing, Pearson Education.
11. Anil K. Jain -Fundamentals of digital image processing. Prentice Hall, 1989

Subject Code	Subject Name	Teaching Scheme (Contact Hours per week)			Credits Assigned			
MCA303	Network security							
		Theory	Pract	Tut	Theory	Pract	Tut	Total
MCA303	**Network security**	**04**	**--**	**--**	**04**	**--**	**--**	**04**
		Examination Scheme						
	Theory				**Term Work**	**Pract**	**Oral**	**Total**
Internal Assessment			**End Sem. Exam.**					
Test 1	**Test 2**	**Average**	**[Once in a semester]**					
20	**20**	**20**	**80**		**--**	**--**	**--**	**100**

Objectives   In this course students will learn about different aspects of security. , major hash functions, various forms authentications and cryptographic algorithms such as public key cryptographic algorithm, secret key cryptographic algorithm etc. Students are introduced to different security protocols required for E-mail security and for secure electronic transactions last but not the list they will learn two most important security threats i.e. Viruses and Intruders.

Outcomes   Students will learn importance of security over internet. They will be familiar with how the security is achieved using as various cryptographic algorithms such as public key cryptographic algorithm, secret key cryptographic algorithm, hashing algorithms etc. Students will have knowledge of different security protocols required for E-mail security and for secure electronic transactions as well as most important security threats.

| Unit No	Contents	No of. Hrs.
Unit I	**Introduction:** Attacks, Services and Mechanisms, Security Attacks, Security Services, Integrity check, digital Signature, authentication, hash algorithms	**4 Hrs.**
Unit II	**Secret Key Cryptography:** Block Encryption, DES rounds, S- Boxes IDEA: overview, comparison with DES, Key expansion, IDEA rounds, Uses of Secret key Cryptography; ECB, CBC, OFB, CFB, Multiple encryptions DES.	**6 Hrs.**
Unit III	**Public Key Cryptography:** Introduction to modular arithmetic, RSA, Digital Signature, Deffie-Hellman Key Exchange.	**5 Hrs.**
Unit IV	**Hash Functions and Message Digests:** MD2, MD5, SHA and HMAC algorithms	**6 Hrs.**
Unit V	**Authentication:** Types of Authentication- Password-based authentication, address-based authentication, cryptographic authentication, smart cards, biometrics, mutual authentications, reflection attacksDigital Certificate- creation, verification, revocation, cross-certificationKDC-working, multi domain KDC	**7 Hrs.**
Unit VI	**Standard:** Introduction to Kerberos, working of Kerberos, Inter-realm authentication, Kerberos versions and comparison, names, inter-realm authentication, Key version numbersdelegation, forwarding and proxies, ticket lifetimes, revoking tickets	**4 Hrs.**
Unit VII	**Internet Security Protocols:** SSL, SET, Email Security- PGP, PEM, S/MIME, IPSec-Overview, Authentication Header, ESP	**6 Hrs.**

Unit VIII   **Firewall and Intrusion detection System:** Introduction to Firewalls, its types**,   7Hrs.** Intrusion Detection: Methods and Modes, Response, Detection mechanism**,** Honeypots-purpose, categories, use.

Instructions for conducting Tutorials: At least 08 tutorials

1. Numerical problems on DES, IDEA, MD2, MD5, Deffie-Helmann and RSA
2. Tutorial on Comparative study of network Tools: TCPDUMP, Wireshark,NMap
3. Tutorial on SHTTP
4. Tutorial on TLS

References
1. AtulKahate, "Cryptography and Network Security", McGraw Hill
2. Kaufman C., Perlman R., and Speciner, "Network Security", Private Communication in a public world, 2nd ed., Prentice Hall PTR.,2002
3. Eric Cole, "Network Security Bible", Wiley India Edition
4. Network Security & Cryptography, 1e, Bernard Menezes, Cengage Learning
5. Willam Stallings, "Cryptography and Network Security: Principles and Practice", 3rd ed., Prentice Hall PTR.,2003.
6. Stallings, "W.Network security Essentials: Applications and standards", Prentice Hall, 2000
7. Behrouz A Forouzan, "Cryptography & Network Security" ,McGraw-Hill
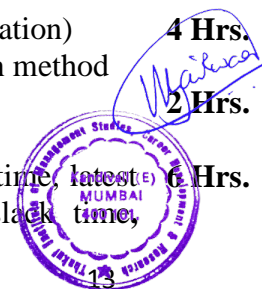8. Cloud security and privacy   by Tim Mather kumaraswamyoreilly
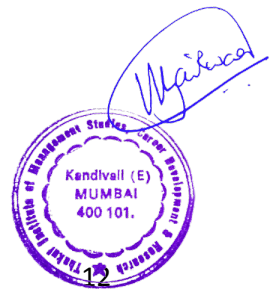
MCA304			Operation Research						
Subject Code	**Subject Name**		**Teaching Scheme (Contact Hours per week)**			**Credits Assigned**			
			Theory	Pract	Tut	Theory	Pract	Tut	Total
MCA304	**Operation Research**		04	--	--	04	--	--	04
Examination Scheme									
Theory					**Term Work**	**Pract**	**Oral**	**Total**	
Internal Assessment			**End Sem. Exam.**						
Test 1	Test 2	Average	[Once in a semester]						
20	20	20	80		--	--	--	100	

Objectives	Operations research is a scientific approach to analyzing problems and making decisions. It uses mathematics and mathematical modeling on computers to forecast the implications of various choices and identify the best alternatives.
Outcomes	Operations research methodology is applied to a broad range of problems in both the public and private sectors. Many problems deal with the allocation of scarce human resources, money, materials, equipment or facilities. Applications include staff scheduling, vehicle routing, warehouse location, product distribution, quality control, traffic light phasing, police patrolling, preventive maintenance scheduling, economic forecasting, design of experiments, power plant fuel allocation, stock portfolio optimization, cost-effective environmental protection, inventory control and university course scheduling.

Unit No	Contents	No of. Hrs.
Unit I	**Nature of Operation Research :** History ,Nature of OR ,Impact of OR ,Application Areas	**1 Hrs.**
Unit II	**Overview of modeling approach** Formulating the problem, Constructing a mathematical model, Deriving a solution, Testing a model and the solution, Establishing control over the solution, Implementation issues	**1 Hrs.**
Unit III	**Linear Programming :**Introduction ,Graphical solution **,**Graphical sensitivity analysis ,The standard form of linear programming problems **,**Basic feasible solutions ,Simplex algorithm ,Artificial variables ,Big M and two phase method ,Solution to Problems based on Degeneracy, Alternative optima ,Unbounded solutions ,Infeasible solutions	**10 Hrs.**
Unit IV	**Dual Problem :**Relation between primal and dual problems, Dual simplex method, Sensitivity analysis	**5 Hrs.**
Unit V	**Transportation problem :**Starting solutions. North-west corner Rule – lowest cost methods – Vogels approximation method, MODI Method, Minimization and Maximization problem	**5 Hrs.**
Unit VI	**Assignment problem :**Hungarian method (Minimization and Maximization) **Travelling salesman problem :**Branch & Bound technique, Hungarian method	**4 Hrs.**
Unit VII	**Sequencing Problem :**2 machines n jobs ,3 machines n jobs , n machines m jobs	**2 Hrs.**
Unit VIII	**PERT and CPM :**Arrow network ,Time estimates, earliest expected time, latest allowable occurrence time, latest allowable occurrence time and slack time,	**6 Hrs.**

	Critical path ,Probability of meeting scheduled date of completion of project ,Calculation of CPM network ,Various floats for activities ,Project crashing	
Unit IX	**Replacement theory :**Replacement of items that deteriorate , Replacement of items that fail group replacement and individual replacement.	**3 Hrs.**
Unit X	**Decision Theory:** Classification of Decisions, Steps in decision theory approach**,** Decision making under certainty**,** Decision making under uncertainty**,** Decision making under risk**,** Decision making under conflict**,** SIMONS's Model	**6 Hrs.**
Unit XI	**Game theory:**Two person Zero sum games, Solving simple games	**2 Hrs.**

Instructions for Students' Assignments: Each candidate will submit a journal which will have case studies on Decision Theory, PERT-CPM and Replacement theory.

References:

1. Hillier F., and Lieberman, G.J. "Introduction to Operation Research", Holden Day
2. Operations Research Applications and Algorithms Waynel L. Winston Thomson
3. Kambo, N.S., "Mathematical Programming Techniques", McGraw Hill
4. Operations Research : Principles and Practice 2nd edition Ravindran Wiley Production
5. Operations Research, 1e, Prasad, Cengage Learning
6. Optimization methods K.V. Mital& Mohan New Age
7. KantiSwaroop, Gupta P.K. Man Mohan, "Operations Research", Sultan Chand and Sons
8. Taha, H.A. "Operations Research – An Introduction", McMillan Publishing Company, NY
9. Operation Research – S.D. Sharma
10. Operations Research by P. K. Gupta &Hira S. Chand
11. Principles of Operation Research (with applications to managerial decisions) – H.M Wagher, PHI, New Delhi
12. Operation Research –Ravindran

MCA305			Software Project Management					
Subject Code	**Subject Name**		**Teaching Scheme (Contact Hours per week)**			**Credits Assigned**		
			Theory	Pract	Tut	Theory	Pract	Tut	Total
MCA305	Software Project Management		04	--	--	04	--	--	04

Examination Scheme								
Theory					**Term Work**	**Pract**	**Oral**	**Total**
Internal Assessment			**End Sem. Exam.**					
Test 1	Test 2	Average	[Once in a semester]					
20	20	20	80		--	--	--	100

Objectives   Understand iterative development and its benefits. Identify the responsibilities, types of deliverables and interdependencies of the iterative development team. Describe the changing emphasis of Project management as a project progresses through phases and iteration. And to understand important consideration when analyzing a completed iterative project.

Outcomes   Gives in-depth knowledge on system view of project management and its iterative development and benefits. Provides knowledge on changing emphasis and quality. And gives deep knowledge on risk management and closing on project

Unit No	Contents	No of. Hrs
Unit I	**An Overview of IT Project Management:** What is project?What is project Management,The role of project Manager**,** The project Management Profession Understanding organizations, Stakeholder management, Project phases and the project life cycle	3 Hrs.
Unit II	**Conceptualizing and Initializing IT project :** Information Technology Project Methodology**,** Business case, Project selection and Approval,Project management processes**,** Project charter**,** Project Planning Framework	4 Hrs.
Unit III	**Project Scope management:** Scope definition and Project Scope management**,** Creating the Work Breakdown Structures**,** Scope Verification **,** Scope Control	4 Hrs.
Unit IV	**Scheduling and Budgeting: Developing** the Project Schedule, Schedule Control, Basic Principles of Cost Management, Cost Estimating: Types of cost estimates, Cost estimation Tools and Techniques,Cost Budgeting,Cost Control:Earned Value Management,Project Portfolio Management.	8 Hrs.
Unit V	**Project Quality and Communication management:** Tools and Techniques for Quality Control,Pareto Analysis**,** Statistical Sampling**,** Six Sigma**,** Quality, Control Charts and the seven Run Rule**,** Modern Quality management: Juran and the importance of Top management, commitment to Quality, Crosby and Striving for Zero defects, Ishikawa and the Fishbone Diagram, Improving Information Technology Project Quality, The Project Communication Plan Reporting Performance and Progress, Information Distribution	6 Hrs.
Unit VI	**The Importance of Project Procurement Management :** Planning Purchases and Acquisitions, Planning Contracting, Requesting Seller Responses, Selecting Sellers, Administering the Contract, Closing the Contract Using Software to Assist in project Procurement Management, Out Sourcing, The Beginning of the outsourcing phenomenon, Types of outsourcing relationship, The realities of outsourcing, Managing the outsourcing relationship	6 Hrs.

Unit VII	**The Risk Management Plan:** Introduction**,** IT Project Risk Management, Planning Process**,** Identify IT Project Risk**,** Risk Analysis and Assessment**,** Risk Strategies **,** Risk Monitoring and Control**,** Risk Response and Evaluation	**4 Hrs.**
Unit VIII	**Human Resource Management:** Human Resource Planning**,** Acquiring the Project Team:Resource Assignment, Resource Loading**,** Resource Leveling Developing the Project Team, Managing the Project Team, Change management : Dealing with Conflict & Resistance Leadership & Ethics	**4 Hrs.**
Unit IX	**The Project Implementation Plan and Closure :** Project ImplementationAdministrative Closure**,** Project Evaluation **Leadership & Ethics in Projects:** Project Leadership**,** Ethics in Projects, Multicultural Projects	**6 Hrs.**

References:
1. Information Technology Project Management : Jack T. Marchewka Wiley Publication
2. Managing Information Technology Projects, 6e, Kathy Schwalbe, Cengage Learning
3. Project Management Core Textbook : Samuel J. Mantel, Jack R. Meredith, Scott M. Shafer, Margaret M. Sutton with M. R. Gopalan
4. Quantitive techniques for project management   by Rettyvelayudam SPD
5. Information Technology Project Management : Kathy Schwalbe Thomson Publication
6. Software Project Management (SIE): HUGHES McGraw Hill
7. Software Engineering Project Management by Richard Thayer , Edward Yourdon WILEY INDIA

L301   **Laboratory I – Computer Graphics**

Subject Code	Subject Name	Teaching Scheme (Contact Hours per week)			Credits Assigned			
		Theory	Pract	Tut	Theory	Pract	Tut	Total
L301	**Laboratory I – Computer Graphics**	--	06	--	--	03	--	03

Examination Scheme				

End Sem. Exam. [Once in a semester]				

	Laboratory Name	Term Work	Pract	Oral	Total
L301	**Computer Graphics**				
	Computer Graphics	25	50	25	100
	Assessment / Practical Examination in Computer Graphics	25	40	25	90
	Journal/Documentation	--	10	--	10

Objectives	Through this course students are introduced to Implementation of fundamental computer graphics algorithms and basic image enhancement techniques.
Outcomes	After completion of this course students are expected to know how to a rasterize line, circle etc. and implement 2D-3D transformations such as translation, rotation, scaling, shearing, and reflection. They are also expected to understand and be able use them to implement them in animation. They are expected to know how to apply different image transformation on an image.

Unit No	Contents	No of. Hrs
	Computer Graphics **Unit I to Unit X & Unit XII to Unit XVI to be implemented in C++**	
Unit I	Introduction to graphics coordinates system and demonstration of simple inbuilt graphic functions	**1 Hour**
Unit II	Implementation of line generation	**4 Hrs.**
Unit III	Implementation of circle drawing	**4 Hrs.**
Unit IV	Implementation of ellipse drawing	**2 Hrs.**
Unit V	Implementation of curve drawing	**4 Hrs.**
Unit VI	Implementation of filling algorithms	**4 Hrs.**
Unit VII	Implementation of two dimensional transformations	**4 Hrs.**
Unit VIII	Implementation of clipping algorithms	**6 Hrs.**
Unit IX	Implementation of 3D Transformations (only coordinates calculation)	**2 Hrs.**
Unit X	Implementation of fractal generation	**4 Hrs.**
Unit XI	Implementation of animation programs (using any software) Image Processing Practical to be implemented in C++	**10 Hrs.**
Unit XII	Implementation of Basic Intensity Transformations	**4 Hrs.**
Unit XIII	Implementation of Piecewise-Linear Transformation Functions	**4 Hrs.**
Unit XIV	Implementation of histogram equalization	**4 Hrs.**
Unit XV	Implementation of Smoothing Spatial Filters	**4 Hrs.**

Subject Code	Subject Name	Teaching Scheme (Contact Hours per week)			Credits Assigned			
		Theory	Pract	Tut	Theory	Pract	Tut	Total
L302	Laboratory II – DBMS + Software Testing(ST)	--	06	--	--	03	--	03
			04 (DBMS) + 02(ST)			02 (DBMS) + 01(ST))		

Examination Scheme
End Sem. Exam. [Once in a semester]

Laboratory Name		Term Work	Pract	Oral	Total
L302	Laboratory II – DBMS + Software Testing	25	50	25	100
	DBMS	15	25	15	55
	Software Testing	10	15	10	35
	Journal/Documentation	--	10 (5+5)	--	10

DBMS Practical

Objectives	To teach database handling(creation , manipulation)
	To teach queries on the databases(single, multiple)
	To teach PL/SQL programming
Outcomes	Students should be able to create and handle databases
	Students should be able to write and execute queries on the databases
	Students should be able to write and execute PL/SQL programming

Practical No.	Contents	No of Hrs.
Unit I	**SQL Practical** **Data Definition Language:** Create, Alter, Drop, Rename, Truncate **Data Manipulation Language:** Insert, Update, Delete, Select	4 Hrs.
Unit II	**Data Control Language:**Grant, Revoke, Roles **Transaction Control:**Commit, Rollback, Savepoint **SQL SELECT Statements:**Selecting All Columns, Selecting Specific Columns, Column Alias, Concatenation Operator, Arithmetic Operators, Comparison Conditions, Logical Conditions, ORDER BY Clause	4 Hrs.
Unit III	**Functions:** Single Row Functions, Character Functions, Number Functions, Date Functions, Conversion Functions, General Functions, Multiple Row Functions, Group Function **Subquery:** Subquery, Types of Subquery, Group Function, Having Clause	4 Hrs.
Unit IV	**Joins:** Equijoins, Non-Equijoins, Joining Three Tables, Self Joins, Left Outer Joins, Right Outer Joins, Full Outer Joins, Cross Joins, Natural Joins **Other Concepts:** Sequence, View, Index, Synonyms	4 Hrs.
Unit V	**Constraints:** Not Null, Unique Key, Primary Key, Foreign Key, Check, Dropping	4 Hrs.

	a Constraint, Enabling & Disabling	
Unit VI	**PL/SQL Practical**	**4 Hrs.**

Unit VI   **PL/SQL Practical**   **4 Hrs.**

a Constraint, Enabling & Disabling

Unit VI   **PL/SQL Practical**   **4 Hrs.**

Programming: Variables, Identifiers, Comment, PL/SQL Block Structure

IF Statements: Simple IF Statements, Compound IF Statements
    IF-THEN-ELSE Statements

Loop: Basic Loop, WHILE Loop, FOR Loop

Unit VII   **DML Operations Using PL/SQL:** Insert, Update, Delete, Merge   **4 Hrs.**

Unit VIII   **Cursor:** Types of Cursor, Explicit Cursor Life Cycle, Explicit Cursor Attributes   **4 Hrs.**

Trigger: Trigger, Statement Trigger, Row Trigger, Using Conditional Operations, DML Operations

Unit IX   **Exceptions:** Block Structure, Exception Handlers, Types of Exceptions   **4 Hrs.**

Records: Table-Based, Cursor-Based, Programmer-Defined

Unit X   **Functions:** Create Function, Function with Arguments, Executing Function, Dropping Function   **4 Hrs.**

Procedures: Block Structure of Subprogram, Types of Subprograms, Procedure with Parameters, Executing Procedures, Dropping Procedures

Packages: Package Specification, Package Body, Creating Package, Execution, Dropping Package

Reference Books:

1. Joel Murach, "Murach's oracle PL /SQL" Joel Murach's publication Murachs and Assocites
2. Sharnam shah, Vaishali Shah, "Oracle for Professionals"Publication SPD-Shroff Publishers and Distributors 2011
3. RiniChakrabarti, ShilbhadraDasgupta, KLSI, "Advanced Data Base Management System ", Publication DreamTech
4. Chakravarti , "Advance Data Base Management System", Wiley -Dreamtech
5. Kogent Learning Solutions Inc, "Advanced Database Theory and ApplicationOracle 11 G Black Book", Publication DreamTech
6. Kogent Learning Solutions Inc, "SQL Server Programming-Black Book " Publication DreamTech
7. RajshekharSundaram, "Oracle 10g Programming: A Premier", Publication Pearson Education 2009
8. Peter Rob and Coronel, "Database Principals fundamentals of Design, Implementation and Management", Publication Cengage Learning 2011
9. Catherine Ricardo, "Database Illuminated " Publication Jones &Barlet Students edition 2011
10. Patrick O'NEIL , Elizabeth O'NEIL, "Database principles, programming and performance " Publication Elsevier 2010,2011.

Software Testing Practical

Objectives   Identify the need of software testing in current industry scenario, understanding and knowledge of foundations, techniques and tools in area of software testing , also to demonstrate the ability to apply multiple methods to develop, to check reliability for a software system, to identify and apply redundancy and fault tolerance for a medium-sized application, to identify methods that will lead to the realization of a software, to have architecture that achieves a specified reliability level, to identify the Fault in program logic that fails to validate data and values properly before they are used, to discuss the distinctions between validation, for testing and defect testing, to understand types of testing, to understand the essential characteristics of tool used for test automation, to identify requirements and usage of Automation tools

Outcomes   At the end of this course the student should be able to:
Understand the concept and need of software testing, to understand current scenario in the field of Software testing, to have thorough knowledge of software testing and its types, should have the knowledge of testing methodology and framework, should be expert in writing test cases for any given module, to understand the need and usage of software tools, to identify types of software testing tools as, test management tools, functional testing tools and performance testing tools, have hands on experience on any industry popular Software Tools.

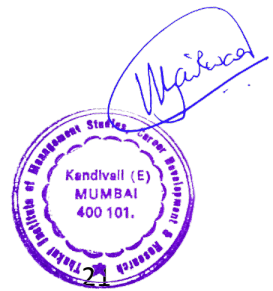**Testing Lab :**
- Manual Testing (MT)* Automation Testing(AT)

Unit No	Contents	No of Hrs.
Unit I	MT: Introduction to Software Testing: Functional and non Functional Testing, Writing Test cases, Testing Framework, Test Documents	2 Hrs.
Unit II	MT: Static Testing: Data Flow Analysis, Control Flow Analysis, Cyclomatic Complexity MT : White Box Testing: Statement Coverage, Branch Coverage, Path Coverage, State Transition	2 Hrs.
Unit III	MT: Black Box Testing: Equivalence Class Partitioning, Boundary Value Analysis, Cause Effect Graphing and Decision table technique, Use case testing	2 Hrs.
Unit IV	MT: Manual Testing on a Existing Project/IRCTC/Face book/Currency Converter	2 Hrs.
Unit V	AT: QTP Introduction, recording and replaying test cases	2 Hrs.
Unit VI	AT:QTP Synchronization Point	2 Hrs.
Unit VII	AT: QTP Parameterization	2 Hrs.
Unit VIII	AT: QTP Checkpoints(Windows and Web application)	2 Hrs.
Unit IX	AT: Recording modes in QTP	2 Hrs.
Unit X	AT: Virtual object creation and environment variables	2 Hrs.
Unit XI	AT: Action reusability	2 Hrs.
Unit XII	AT: Bugzilla Introduction and usage	2 Hrs.
Unit XIII	AT: Bugzilla :Creating /Reporting a new bug, Viewing Bug reports, Modifying Bug reports	2 Hrs.
Unit XIV	AT: Performance Testing Concepts :Load Testing, Stress Testing	2 Hrs.

References 1.Testing in 30 + open source tools   by shende SPD
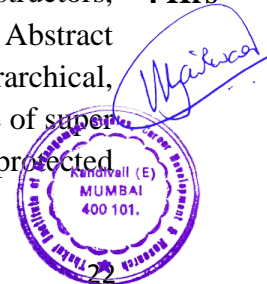2.   Software testing foundations   2e dandreasspillner SPD
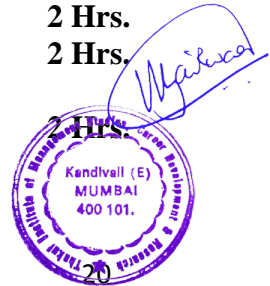
MCA

Semester IV

Syllabus

MCA401		Core & Advanced JAVA						
Subject Code	**Subject Name**	**Teaching Scheme (Contact Hours per week)**			**Credits Assigned**			
		Theory	Pract	Tut	Theory	Pract	Tut	Total
MCA401	**Core & Advanced JAVA**	04	--	--	04	--	--	04
		Examination Scheme						
		Theory			**Term Work**	**Pract**	**Oral**	**Total**
Internal Assessment			**End Sem. Exam. [Once in a semester]**					
Test 1	Test 2	Average						
20	20	20	80		--	--	--	100

Name of Subject	Core & Advanced JAVA
Semester	IV
Objectives	To enable the students to understand the core principles of the Java Language. To enable students to learn to produce well designed, effective standalone applications. To enable students to learn to produce well designed, dynamic Web applications. To introduce tools, technologies and framework hence Java Beans, Servlets, JSP,EJB and struts are introduced to enhance web development skills.
Outcomes	Students understand the core principles of the Java Language. Students learn to produce well designed, effective standalone applications. Students learn to produce well designed, dynamic Web applications. Students learn latest technologies, tools and frameworks.

Unit No	Contents	No of. Hrs
Unit I	**Fundamentals of java:** History of Java, Features of Java, Object oriented concepts related to java, Java environment and tools (javac, java, appletviewer, javadoc, jdb), Garbage collection and finalize method, Data types, variable, expressions, operators, and control structures, arrays, string and mutable string.	**2 Hrs**
Unit II	**Objects and classes:** Instance variables and instance methods, Constructors, Method overloading and constructor overloading, Access specifies, Abstract classes, Wrapper classes, Inheritance in java, Single, multilevel, Hierarchical, Static and final keyword, Runtime polymorphism, Method overriding, Use of super and this keyword. Visibility control**:** public access, friendly access, protected access, private access, private protected access.	**4 Hrs**

|		
Unit III	**Packages and Interfaces :** Package concept, Creating user defined package, Access control protection, Defining interface, Implementing interface.	**2Hrs**
Unit IV	**Exception handling:** Exception handling fundamentals, Exception types, Exception as objects, Exception hierarchy, Try, catch, finally, throw, throws.	**2Hrs**
Unit V	**Multi threading:** Java thread model, Working with Thread class and the Runnable interface, Thread priorities, Inter thread communication, Synchronization.	**2Hrs**
Unit VI	**Input /Output: Exploring java.io :** Input streams and Output streams, FileInputStream and FileOutputStream, Binary and Character streams, Buffered Reader/ Writer, Object serialization and Deserialization.	**2Hrs**
Unit VII	**Event handling and GUI programming:** Event handling mechanisms, Event classes, event listener interfaces Swing components, JApplet, Exploring controls, menus and layout managers, Adapter class, Inner class.	**3Hrs**
Unit VIII	**Database Connectivity:** JDBC architecture, Types of drivers, Java.sql package, Establishing connectivity and working with connection interface, Working with statement interface, Working with PreparedStatement interface, Working with ResultSet interface, Working with ResultSetMetaData interface.	**3Hrs**
Unit IX	**Web development using Servlets:** Introduction to servlets, Servlet vs CGI, Servelet API overview, Servlet Life cycle, Generic servlet, HTTPServlet, ServletConfig, ServletContest, Handling HTTP Request and response –GET / POST method, Using cookies, Session tracking.	**6Hrs**
Unit X	**Web development using JSP:** Introduction to JSP, JSP Architecture, JSP Directives, JSP scripting elements, Default objects in JSP, JSP Actions, JSP with beans and JSP with Database, Error handling in JSP, Session tracking techniques in JSP, Introduction to custom tags.	**6Hrs**
Unit XI	**Enterprise Java Beans:** Introduction to Enterprise java beans, Types of EJB (session bean ,entity bean and message driven bean), Sample program on EJB.	**3Hrs**
Unit XII	**Java and XML:** Introduction XML, DTD, XML schema, XML Parser, Validator, Processor and programming, XML related standards like XHTML AND DOM.	**3Hrs**
Unit XIII	**Introduction to Frameworks:** History of Struts, Introduction to Struts 2 :features,Struts Architecture, Struts 1.X vsStructs 2.X, Sample program on struts framework, Struts Action, Redirect Action, Validations, I18N in struts.	**7Hrs**

References:

1. The complete reference JAVA2, Herbert schildt. Tata McGraw Hill
2. Core Java for beginners, Sharanam Shah and vaishali shah, SPD
3. Struts 2 for beginners, Sharanam Shah and vaishali shah, SPD
4. Advance Java-Savalia,Core,Java 6 Programming Black Book, Wiley –Dreamtech
5. Java Programming Advanced Topics w/2CDs ,3e, Wigglesworth, Cengage Learning
6. Commercial web development using java 2.0, Ivan Byaross, BPB
7. Struts in Action, Donald Brown, Dreamteach press
8. Java Server Programming java EE6, Black book, Dreamtech press.
9. Core Servlets and Java Server Pages :Vol I: Core Technologies 2/e , Marty Hall and Larry Brown, Pearson
10. Java EE 6 for Server Programming for professionals, Sharnam Shah and vaishali shah, SPD
11. Java 6 Programming, Black Book, Dreamtech Press.
12. Programming with Java A Primer, E.Balaguruswamy Tata McGraw Hill
13. XML Complete Reference, Tata McGraw Hill

MCA402		Advanced Database Theory and Applications						
Subject Code	Subject Name	Teaching Scheme (Contact Hours per week)			Credits Assigned			
		Theory	Pract	Tut	Theory	Pract	Tut	Total
MCA402	Advanced Database Theory and Applications	04	--	--	04	--	--	04

Examination Scheme							
Theory				Term Work	Pract	Oral	Total
Internal Assessment			End Sem. Exam. [Once in a semester]				
Test 1	Test 2	Average					
20	20	20	80	--	--	--	100

Name of Subject	Advanced Database Theory and Applications (ADTA)
Semester	IV
Objectives	To acquaint the students with some relatively advanced issues in modern data management, information storage and retrieval.
Outcomes	Students should be able to gain an awareness of the basic issues parallel and distributed data organizations, Students learn about the emerging database models including multimedia, spatial and temporal databases, Web-DBMS integration technology with XML for Internet database applications, acquaint themselves with the data-warehousing and data-mining techniques and its applications, apply the knowledge acquired to solve simple

Unit No.	Contents	No of hours
Unit I	**Parallel and Distributed Databases :** **Parallel Databases:** Architecture for Parallel Databases, Parallelizing Individual operations, Parallel query Evaluation **Distributed Databases:** Introduction to DDBMS, Architecture of DDBs, Distributed Storage, Distributed Database Design and Query Processing , Distributed transaction Processing , Distributed concurrency Control & Recovery, Distributed catalog management.	10Hrs
Unit II	**Datawarehousing:** Data warehouse overview and concepts: Need for data warehousing, Basic elements of data warehousing, Data warehouse Architecture And Infrastructure: Architectural components, Infrastructure and metadata. DW life cycle. Data extraction, transformation and loading, Data Quality	4Hrs
Unit III	**Principles of Dimensional Modeling** Dimensional Modeling: Star Schema, Snowflake Schema, Fact Constellation Schema	6Hrs
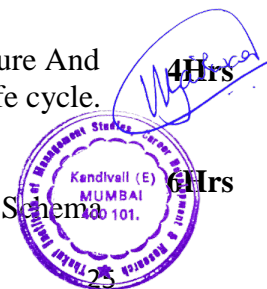
OLAP Architecture, Relational OLAP, Multidimensional OLAP, Relational vs. Multidimensional OLAP, Web based OLAP, Major features & functions- Drill-Down and Roll-Up, Slice-and- Dice or Rotation, Implementation techniques for OLAP- Bitmap Indexes, Join Indexes.

Unit IV   Data Mining
Introduction to data mining, Knowledge discovery- KDD process,
Classification techniques- Statistical-based algorithm (Bayesian Classification), Distance-based algorithm(K-Nearest Neighbor), Decision tree-based algorithm(ID3, C4.5 and CART),Neural Network-Based Algorithm:Propagation   **14Hrs**
Clustering-HierarchicalAlgorithm(Agglomerative lgorithms),Partitional Algorithms (K-mean clustering, Nearest Neighbor), Clustering large database(BIRCH)
Association Rule mining- Basic algorithm (Apriori Algorithm and Partitioning)
Web Mining: Web Content Mining , Web Structure Mining , Web Usage Mining

Unit V   Object based databases
Overview, Complex data types, structured types and inheritance in SQL,
Table inheritance , Array and Multiset types in SQL, Object identity and reference types in SQL , Persistent programming languages ,   **6Hrs**
Object oriented versus Object relational
Database design for ORDBMS
New Challenges in implementing ORDBMS: Storage & access methods, Query processing and Optimization

Unit VI   Emerging Database Models, Technologies and Applications:
 XML and Internet Databases**:**Structured , Semistructured and Unstructured data,
XML Hierarchical data model , XML documents , DTD and XML Schema,XML   **5Hrs**
documents and databases, XML Querying
Time-in databases, Spatial & Geographic data , multimedia databases

Instructions for assignment and Tutorials:- Each candidate will submit a journal in which at least 03 assignments/seminar based on the above syllabus and appear for two internal test papers.

References:

1. Raghu Ramakrishnan, Johannes Gerhke, "Database Management Systems" McGraw Hill
2. PaulrajPonniah, Data Warehousing fundamental –JohnWiley.
3. M.H. Dunham &S.Sridhar, "Data Mining Introductory and Advanced Topics", Pearson Education.
4. Ralph Kimball, "The Data Warehouse Lifecycle Toolkit", John Wiley.
5. Introduction to data mining with case studies –G.K. Gupta
6. Elmasri ,Navathe, Somayajulu and Gupta"Fundamentals of Database Systems",Pearson Education
7. Korth, Silberchatz, Sudarshan, "Database System Concepts"McGraw Hill
8. Daniel T Larose, Data Mining Methods & Models, Wiley India Edition.
9. Peter Rob and Coronel, "Database Systems, Design, Implementation and Management", Thomson Learning.

MCA403		System Modeling and Simulation						
Subject Code	**Subject Name**	**Teaching Scheme (Contact Hours per week)**			**Credits Assigned**			
		Theory	Pract	Tut	Theory	Pract	Tut	Total
MCA403	**System Modeling and Simulation**	04	--	--	04	--	--	04
	Examination Scheme							
	Theory				**Term Work**	**Pract**	**Oral**	**Total**
	Internal Assessment			**End Sem. Exam. [Once in a semester]**				
	Test 1	Test 2	Average					
	20	20	20	80	--	--	--	100

| Name of Subject	**System Modeling and Simulation**
Semester	IV
Objectives	Modeling and Simulation, commonly referred as MODSIM, is becoming one of the academic programs of choice for students in all disciplines. Through it students are introduced to the fundamental notion of modeling,approximating, and simulatingthe real - world scenarios such as Computer systems, manufacturing systems, Banking Systems, Network models, and Business Models.
Outcomes	In Modeling and Simulation study students will study the basics of **modeling** as a way to understand the various modeling paradigms appropriate for conducting digital computer simulations. They will understand **simulation** and the methodology, development, verification and validation, and design of simulation experiments. They will be introduced to the Multidisciplinary Real World Problems of Modeling and Simulation.

Unit No.	Contents	No. of Hrs
Unit I	**Introduction:** What is modeling and Simulation: History, Application areas, Advantages and Disadvantages, Role of modeling and simulation for Problem solving, Types of simulation models and examples: static (Monte Carlo simulation and its application to industries), dynamic (Bank), deterministic (arrivals at scheduled appointment time), stochastic (random arrivals and service time), Discrete event simulation (queuing system), continuous (communication and traffic system). List Processing in Simulation. Steps in simulation study. Uses of simulationwith examples (Experimentation, experience, ethics, human interaction)	4Hrs
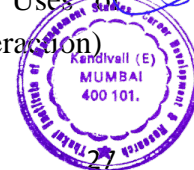
Unit II **Description and Solution of Simulation Examples:** Simulation Examples based **10Hrs**
on statistical distributions: Discretedistributions,Continuousdistributions,Poisson
process,Empiricaldistribution. Simulation of Queuing system: characteristics,
notation, Measures of performance of Queuing system, example of single channel
of Queue, the Able Baker call center problem, Simulation of inventory system
(News Paper seller problem), Other examples: Reliability problem, Use of random
normal numbers for simulation, project simulation, Lead Time Demand, Job Shop
Model.

Unit III **Simulation Model using Random Numbers and Random variates:** Random- **10Hrs**
Number Generation: Properties of Random Numbers, Generation of Pseudo-
Random Numbers, Techniques for Generating Random Numbers, Tests for
Random Numbers. Random Variate Generation:Inverse Transformation Technique
– Uniform Distribution, Exponential Distribution, Weibull Distribution, Discrete
Distribution, Direct Transformation for the Normal Distribution. Convolution
Method for Erlang Distribution, Acceptance-Rejection Technique – Poisson
Distribution, Gamma Distribution.

Unit IV **Input Analysis: Input Models with Data:** Data Collection, Identifying the **10Hrs**
Distribution with Data - Parameter Estimation, Goodness of Fit Tests: Chi-Square
Test, Kolmogorov-Smirnov Test; Selecting Input Models without Data:
Multivariate and Time-Series Input Models.

Output Analysis: Stochastic Nature of Output Data - Types of Simulation with
respect to Output Analysis - Measures of Performance and their Estimation -
Output Analysis for Terminating Simulations - Output Analysis for Steady-State
Simulation

Unit V **Verification & Validation and Optimization of Simulation Models:** Model **6Hrs**
Building, Verification and Validation; Verification of Simulation Models -
Calibration and Validation of Models:- Face Validity, Validation of Model
Assumptions, Validating Input-Output Transformations - Input-Output Validation
using Historical Input Data, Input-Output . Validation using a Turing Test.
Optimization via simulation examples.

Unit VI **Modeling and Simulation of Real World Problem:** Simulation of manufacturing **5Hrs**
systems,Simulationofcomputersystems,Simulationofsupermarket,Simulationofpertn
etwork. Simulation of Transportation model, business model, Medical models,
Social Science models.

References:

1. J. Banks, J. S.Carson II and B. L. Nelson,, "Discrete-Event System Simulation", 2nd Edition, Prentice Hall of India, New Delhi, 1995.
2. Simulation &Modelling- Jain, Wiley -Dreamtech
3. J. A. Sokolowski, C.M. Banks, " Principles of Modeling and Simulation: A multidisciplinary Approach", John Wiley & Sons Publications, edited 2011.
4. Averill M.Law and W.DavidKelton, "Simulation Modeling & Analysis", 2nd Edn., Tata McGraw Hill, 1991.
5. Geoffrey Gardon, "System Simulation", 2nd Edn.,Printice Hall of India, 1992.
6. NarsinghDeo, " System Simulation with Digital Computers", Prentice Hall of India, 1979.

	MCA404	Soft skill development						
Subject Code	**Subject Name**	**Teaching Scheme (Contact Hours per week)**			**Credits Assigned**			
		Theory	**Pract**	**Tut**	**Theory**	**Pract**	**Tut**	**Total**
MCA404	**Soft skill development**	04	--	--	04	--	--	04

Examination Scheme							
Theory				**Term Work**	**Pract**	**Oral**	**Total**
Internal Assessment			**End Sem. Exam. [Once in a semester]**				
Test 1	**Test 2**	**Average**					
20	20	20	80	--	--	--	100

Name of Subject	Soft Skill Development
Semester	IV
Objectives	A strong knowledge base alone does not guarantee a new graduate employment. Personal attributes and capabilities of the graduate are considered to have a greater influence on success in the workplace.This interactive program will focus on essential skills that professionals need to distinguish themselves and make a positive impact on their work and social lives.The course content aims at providing to the students understanding on the corporate culture and the ability to navigate various situations. The participants shall improve their etiquette skills and professional image.
Outcomes	Students should be able to respond proactively and communicate more effectively & confidently. They should also learn to analyze their audience's needs, how to structure their thoughts and develop key information & to present it appropriately. This program is designed to teach students write e-mails, reports, meeting documents or other business correspondence. The activities in this program are designed to help students recognize the importance of teamwork & motivate them to pool their talents and perform to the best of their ability, both individually and as team players.They will learn valuable strategies thereby making themselves more productive and better capable to lead others. Students should be able to handle their emotions and gear them towards a positive outcome.

Unit No	Contents Life Skills	No of. Hrs
Unit I	Personality: Meaning, Personality Determinants, Traits, Personality types and its impact on career growth. **Learning as Individual**: Diversity in Organizations , Emotions and Moods, Personality and Values, Perception and Individual Decision Making,	**4 Hrs**

Unit II	Attitude: Meaning, Components of Attitude, Functions, changing attitude and its impact on career growth, **Learning as Individual**::Attitudes and Job Satisfaction, Motivation, Motivation: From Concepts to Applications Positive thinking.	**4 Hrs**
Unit III	Goal setting: SMART (Specific, Measurable, Attainable, Realistic, Timely) Goals, personal and professional goals, impact of goals on work life balance, Time Management. **Learning in a Group**: Foundations of Group Behavior, Understanding Work Teams, Dynamics of Group Behavior, Techniques for effective participation, Communication , Leadership , Power and Politics , Conflict and Negotiation	**4 Hrs**
Unit IV	**Learning in an Organization System**: Foundations of Organization Structure , Organizational Culture, Human Resource Policies and Practices. Stress management: Meaning, practical aspects of stress, causes and symptoms of stress, role of counseling in managing stress, Organizational Change and Stress Management	**5 Hrs**
Unit V	**Learning Interpersonal Skills:** Emotional intelligence, Motivation, Assertiveness, Leadership, Team-building.	**3 Hrs**

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Employability Skills

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Unit VI	**Communication:**Concept and meaning of communication, barriers to communication, methods of communication, techniques to improve communication. Communication in a business organization: Internal (Upward, Downward, Horizontal, Grapevine, Problems, Solutions). External Communication. Strategies for conducting successful business meeting. Documentation (notice, agenda, minutes) of meeting. Introduction to modern communication techniques (e-mail, internet, video-conferencing. etc.)	**7 Hrs**
Unit VII	**Written Communication:** Summarization techniques. Principles of Correspondence, language and style in official letter, formats of letters, Application letter and CV writing, Business letters (enquiry to complaints and redressal), E-mail etiquette, Blogging, Business and Technical Reports. Documentation of Meetings. Aptitude tests.	**7 Hrs**
Unit VIII	**Oral Communication:** Public speaking, GD skills, Presentation techniques.	**5 Hrs**
Unit IX		**6 Hrs**
	Interview techniques: Preparing for job interviews, verbal and non-verbal communication during interviews. Observation sessions and role-play techniques to be used to demonstrate interview strategies.	

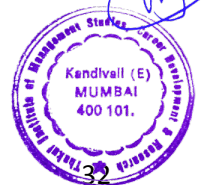**Instructions for Assignment / Presentations/ Group Activities:**
Each student is to appear for at least one written test during the semester . Throughout the semester students will undergo rigorous training for improving English Language and Communication through Presentations, group discussion, writing skills and interpersonal skills

Reference:
1. Business Communication – Meenakshi Raman, Prakash Singh, Oxford Publication
2. Business correspondence and report writing, R.C.Sharma& Krishna Mohan, Tata McGraw Hill
3. Soft Skill for managers-Chakravarthi, Wiley –Dreamtech
4. Soft Skills for Everyone w/CD,1e, Butterfield, Cengage Learning
5. Strategies to improve your Business communication by Prof. M S Rao, SPD

6. Enhancing soft skills   by Dipalibiswas
7. Personality Development and Soft Skills - BarunMitra (Oxford University Press)
8. Pareek, Udai, Understanding OrganisationlBehaviour, Oxford University Press, New Delhi.
9. Stephen Robbins & Judge Timothy: Organization Behavior, Pearson Education
10. Business Communication (Revised Edition),Rai&Rai , Himalaya Publishing House.
11. Lesiker&Petit : Business Communication. Mcgraw Hill Publications.
12. Modern Business Correspondence, Mc Commas &Satterwhite, Sixth Edition, Mcgraw-Hill Publication.

MCA405		Elective I						
Subject Code	**Subject Name**	**Teaching Scheme (Contact Hours per week)**			**Credits Assigned**			
		Theory	**Pract**	**Tut**	**Theory**	**Pract**	**Tut**	**Total**
MCA4051	**Geographic Information Systems**	04	--	--	04	--	--	04
Examination Scheme								
Theory					**Term Work**	**Pract**	**Oral**	**Total**
Internal Assessment			**End Sem. Exam. [Once in a semester]**					
Test 1	**Test 2**	**Average**						
20	**20**	**20**	**80**		--	--	--	**100**

Name of Subject	GIS (Geographic Information Systems)
Semester	IV
Objectives	This course is designed to introduce students to geographic information systems (GIS). The purpose of the course is as follows 1. The course emphasizes geographic information and how it is represented and analyzed with computers. 2. Examine the broad context in which GIS is adopted and used. Understand core concepts of GIS. 3. Gain hands-on experience using ArcGIS software and methods in an integrative fashion with other technologies.
Outcomes	1. Students will learn the coordinate system in GIS and its Application. 2. Students are expected to understand elementary GIS theory and have a working knowledge of Arc GIS. 3. Students will learn the research areas in GIS.

Unit No	Contents	No of. Hrs
Unit I	**Introduction:** What is GIS, The Evolution of GIS Component Of GIS, Approaches to the Study of GIS, Geospatial Data, GIS Operations	**5 Hrs**
Unit II	**Coordinate System:** Geographic Coordinate System, Map Projections Commonly Used Map Projections, Application: Coordinate System	**5 Hrs**
Unit III	**Digital Representation of Geographical Data:** Introduction, Technical Issues Related to Geographic Data, Raster Geographic Data Representation, Vector Data Representation, Object Oriented Geographic Data Representation, Relationship B/W Data Representation and Data Analysis in GIS	**7 Hrs**

Unit IV	**Data Exploration:** Data exploration, Attribute Data Query, Spatial Data Query, Raster Data Query, Map Based Data Manipulation Application: Data Exploration	**6 Hrs**
Unit V	**Vector Data Analysis:** Buffering, Overlay, Pattern Analysis Application: Vector Data Analysis	**4 Hrs**
Unit VI	**Geo-coding and Dynamic Segmentation:** Geocoding, Applications Of Geo-coding, Dynamic Segmentation, Application of Dynamic, Segmentation	**5 Hrs**
Unit VII	**GIS issues and Prospects:** Introduction, Issues of Implementing GIS The Trend of GIS development, Frontiers of GIS Research	**5 Hrs**
Unit VIII	**Student Activity:** Study of various Research Papers on GIS and , resent The Brief about the Papers., Explore the GIS Tool-Arc View/Arc GIS	**8 Hrs**

Instructions for Assignment: Each candidate will submit a journal containing assignments based on the above syllabus.

References:

1. Introduction to Geographic Information Systems-Kang-tsung Chang, TMH, 4th edition.
2. Concepts and Techniques of Geographic Information Systems-C.P.Lo, Albert K.W.Yeung,PHI.
3. Learning and Using Geographic Information System-Wilpen L Gorr, KristenS Kurland-Cengage Learning India Pvt Ltd.
4. GIS-Demers- WIELY PUBLICATION

Subject Code			Subject Name				MCA405				Elective I	

Subject Code	Subject Name	Teaching Scheme (Contact Hours per week)			Credits Assigned			
		Theory	Pract	Tut	Theory	Pract	Tut	Total
MCA4052	Embedded Systems	04	--	--	04	--	--	04

Examination Scheme							
Theory				Term Work	Pract	Oral	Total
Internal Assessment			End Sem. Exam. [Once in a semester]				
Test 1	Test 2	Average					
20	20	20	80	--	--	--	100

Name of Subject	Embedded System
Semester	IV
Objectives	To give sufficient background for undertaking embedded and real time systems design.
Outcomes	1. To introduce students to the embedded systems, its hardware and software. 2. To introduce devices and buses used for embedded networking. 3. To explain real time operating systems and inter-task communication.

Unit No.	Content	No. of Hrs
Unit I	**Introduction to embedded systems:** Categories of embedded systems, overview of embedded system architecture, requirements of embedded systems, challenges and issues related to embedded software development, recent trends in embedded systems, applications of embedded systems.	5 Hrs
Unit II	**8051 and Advanced Processor Architectures, Memory organization and Real world Interfacing** • 8051 Architecture – (Block diagram, explanation of block diagram) • A brief about 8051 Instruction Set • Device addresses in Real world interfacing- address bus, data bus, control bus, memory mapping techniques- I/O mapped I/O, memory mapped I/O • Interrupts in 8051 processor • Introduction to advanced architectures: • ARM 7 processor, DSP processor (Block diagram level), CISC,RISC • Instruction level parallelism (pipelining and superscalar architecture) • Memory : ROM : Masked ROM,	10 Hrs

EPROM, EEPROM, OTP ROM, Flash memory, RAM : SRAM,DRAM, SDRAM,RDRAM, Address allocation in memory.

• Peripheral Devices: Different I/O types, serial devices, parallel port devices, timers and counters, watchdog timer

Unit III	**Communication interface standards:**	**8 Hrs**

Need for communication interface, RS232/UART: RS232 communication parameters, RS232 connector configurations, UART, Null Modem cable connection, USB:USB physical interface, features of USB, IEEE 1394: features, protocol architecture, PCI Bus

Unit IV	**Embedded/Real time operating systems:**	**12 Hrs**

Architecture of the Kernel, Tasks and task schedule

r- task states, context switching, scheduling algorithms, rate monotonic analysis, task management function calls, Interrupt service routines,

Semaphores- semaphore management function calls, Mutex- mutex management function calls, Mailboxes- mailbox management function calls, Message queues- message queue management function calls, Event registers- event register management function calls, Pipes- pipe management function calls, Signals- signal management function calls, Timers- timer management function calls, Memory management, priority inversion problem-priority inheritance. Mechanism of Washing Machine in detail.

Unit V	**Testing, Debugging and simulation techniques**	**5 Hrs**

Compilation process: Cross compilation (concept only) , Linker/Loader, linker/loader options , High level language simulation, Low level language simulation, Onboard debugger, Emulation techniques : JTAG, OnCE

Unit VI	**Overview of Embedded/ Real- time operating systems:**	**5 Hrs**

Embedded operating systems: Embedded NT, Windows XP Embedded, Embedded Linux, Real –time operating systems: QNX Neutrino, VX works, Micro C/OS- II, RT Linux. Handheld OS: iOS, Windows OS

References:
1. Embedded System Design – A Unified Hardware/Software Introduction - Frank Vahid, Tony D. Givargis, John Wiley, 2002.
2. Embedded / Real Time Systems – KVKK Prasad, Wiley Dreamtech Press.
3. Embedded Systems: Architecture, programming and design – Raj Kamal, TMH, 2002.
4. Steve Heath, 'Embedded System design', 2nd Ed., Elsevier, 2009.
5. Embedded Microcomputer Systems – Jonathan W. Valvano, Brooks / Cole, Thompson Learning.
6. An Embedded Software Primer – David E. Simon, Pearson Ed., 2005.

MCA405		Elective I						
Subject Code	**Subject Name**	**Teaching Scheme (Contact Hours per week)**			**Credits Assigned**			
		Theory	**Pract**	**Tut**	**Theory**	**Pract**	**Tut**	**Total**
MCA4053	**Service Oriented Architecture**	**04**	--	--	**04**	--	--	**04**

Examination Scheme							
Theory				**Term Work**	**Pract**	**Oral**	**Total**
Internal Assessment			**End Sem. Exam. [Once in a semester]**				
Test 1	**Test 2**	**Average**					
20	**20**	**20**	**80**	--	--	--	**100**

Name of Subject	**Service Oriented Architecture**
Semester	IV
Objectives	To enable the students to understand the core principles of the Service Oriented Architecture. To enable students to learn to produce well designed, effective integration of applications using web services. To enable students to learn to produce well designed, dynamic Web service based applications. To introduce tools, technologies and framework which will include service provider, service consumer, service registry**.** To increase student business selection knowledge based services
Outcomes	Student will understand web service based working of business between service consumers, service producer. It also make student aware of integration of different web services based on the differ business pattern and using language business process execution language. Student will learn XML based web service description language.

Unit No	Contents	No of. Hrs
Unit I	**Introduction to Middleware:** Generic Middleware, Service Specific Middleware, Client/Server Building, Working of corba, RPC, Java RMI. Promises and Challenges of SOA, Service Oriented Architecture, Business driven SOA	**3 Hrs**
Unit II	**Introduction to Service oriented architecture:** Service orientation in daily life, Drivers for SOA, Dimensions of SOA, Key components of SOA, Services, Enterprise Service Bus, Orchestration, Prospective of SOA, Perspectives of Standard Bodies, Future Trends	**4 Hrs**
Unit III	**Getting started with SOA :**Overview of SOA Implementation Methodology, SOA Reference Architecture, Business Architecture, Business Processes, Information Design, Service Identification, Service Specification, Service	**11 Hrs**
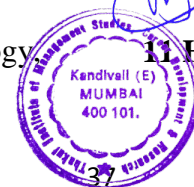
Expectations, Interaction Model, Service Constraints, Service Location, Services Realization, Buying Services, Outsourcing Services, Building Services, Summary of Service Identification and Realization Concerns, Service Life Cycle, The Service Design Process, Top-Down Approaches- Enterprise System Analysis - Business Process Model, Bottom-Up Approaches- Utility Services - Service Enabling, Middle-Out: The Best of Both, Process Summary – Activities- Artifacts – Repositories - Governance, Process Phases - Architectural Context – Business - Design - Implementation - Test, Practical steps

Starting with the Business : Business Architecture, Enterprise Business Architecture, Project Business Architecture, Value Chain, Business Context, Understanding the Business Motivation Model – Ends - Vision - Desired Results, Means - Mission - Course of Action - Directives, Influencers, Alignment and Traceability, Business Process Management and Modeling, Basic Business Process Model Components, Executable Models, Business Process Models in an SOA World

Unit IV	**Common Semantics:**Documents - Defining Documents, Adapting the Information Model, Multiple Documents Documents and XML - XML Schema, Types in Schemas, Document Variations in Schemas, Designing for Change XML Patterns - Derivation Using Abstract Classes, Derivation by Extension , Derivation by Restriction	**3 Hrs**
Unit V	**Service Oriented Enterprise Application :** Consideration for service oriented Enterprise Applications- Service Enablement, Service Integration, Service Orchestration, Service Infrastructure Patterns for SOA- Patterns for Service Enablement, Patterns for Service Integration, Patterns for Service Orchestration, Patterns for Service Infrastructure, Pattern based Architecture for Service oriented Enterprise Applications, Reference Model of Service Oriented, Java EE Enterprise Application, Technical Architecture, Composite Application, SOA programming models -Service Component Architecture (SCA), Windows Communication Foundation (WCF), Enterprise SOA Layer, Solution Architecture for Enterprise Application.	**10 Hrs**
Unit VI	**Service Oriented Analysis and Design:** Need for models, Principles of service Design –Reuse, Integration, Agility Design of Activity Services (or Business Services) -Illustration Design of Data Services, Design of Client Services, Design of Business Process Services, Illustration – Loan Approval Business Process, Explanation of Loan Approval Process	**5 Hrs**
Unit VII	**SOA Governance, Security and Implementation:** SOA Governance- Strategic Architecture (Process, Technologies, People) Development of services (Governance of Service Design, Governance of Service Execution, Governance of Service Modification, Technologies for SOA governance),SOA security (Technologies for SOA security), Approaches for Enterprise-wide SOA Implementation- Strategy (Due Diligence, AS IS Assessment), TO BE Strategy , SOA Development (Transition Planning, Validation, Proof of Concept, Business Process Model), Service Deployment and Monitoring	**6 Hrs**

Unit VIII   **SOA best Practices (Case Study based):** SOA strategy – Best Practices, SOA   **3 Hrs**
Development – Best Practices, SOA Governance – Best Practices

References:
1. Applied SOA by Michael Rosen
2. "Service- Oriented Architecture for Enterprise Applications", Shankar Kambhampaty, Wiley publication
3. G. SudhaSadasivam "Distributed Component Architecture", Wiley India edition.

	MCA405		Elective I						
Subject Code	**Subject Name**	**Teaching Scheme (Contact Hours per week)**			**Credits Assigned**				
		Theory	**Pract**	**Tut**	**Theory**	**Pract**	**Tut**	**Total**	
MCA4054	**E-Business**	**04**	**--**	**--**	**04**	**--**	**--**	**04**	

Examination Scheme								
Theory				**Term Work**	**Pract**	**Oral**	**Total**	
Internal Assessment			**End Sem. Exam. [Once in a semester]**					
Test 1	**Test 2**	**Average**						
20	**20**	**20**	**80**	**--**	**--**	**--**	**100**	

Name of Subject	**E-Business**
Semester	**IV**
Objectives	1. Introduction of various aspects and models for E-business 2. Introduction of electronic market and EDI 3. To study Scope E-business in the market 4. The main objective of managing digital firms is to understand Information system, Perspective on Information system, contemporize approach to information system, learning to use it and new opportunities with technology 5. The main objective of this unit is to understand types of information system its functional perspectives and integrating functions and business process 6. The objective of this unit is to understand organization, management and its strategy and how information system will impact in an organization. 7. The main objective is to develop long range plan in MIS, ascertaining the class of information requirement and its implementation.
Outcomes	1. In-depth knowledge on e-business and its impact 2. Gives knowledge about electronic market and EDI 3. Understand the current scenario of e- business 4. Gives the importance of information system in a digital firm and its new opportunities with technologies. 5. Helps to understand different types of IS in functional perspectives and business process in an organization. 6. Helps to understand concepts of decision making and how decision is taken in an organization. 7. Gives In-depth knowledge why to develop long rang plan and it implementation in MIS.

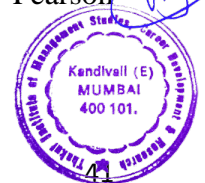| Unit No	Contents	No of Hrs
Unit I	**Overview:** Definitions of Electronic Commerce/Electronic Business, Categories of E-business (b2b, b2c, b2a etc), Introduction to Whiteley's Model (Electronic Markets, EDI, Internet Commerce)	3 Hrs

40

Unit II	**Defining E-business idea:** The Entrepreneurial process,The entrepreneur The entrepreneurial process,Factors affecting E-usiness success, The network effect, Scalability, Innovative web marketing ideas,Ease of entry into electronic markets, Adaptability to change, Exploiting E-business advantages	**5 Hrs**
Unit III	**Impact of E-business on Society:** What is really going on? Issues related to the job market, work patterns, skills required and continuous learning. How local becomes global. IS/IT a positive thing? Privacy and security issues. Information and knowledge.	**6 Hrs**
Unit IV	**Electronic Markets:** Definition and use of Electronic Markets.,Advantages and Disadvantages associated with Electronic Markets, Some functional electronic markets, The future of Electronic Markets.	**4 Hrs**
Unit V	**Electronic Data Interchange (EDI):** EDI definition, (overview of advantages and disadvantages), Technical aspects of EDI, Business implications of EDI.	**6 Hrs**
Unit VI	**E-Business Today:** Current global situation., E-business according to predictions? (good or bad!!), Where does the present situation point to? What needs to be done in order to cater for the future e-business/information society?	**5 Hrs**
Unit VII	**Managing the Digital Firm:** Why Information System?, Perspectives on Information System , Contemporary approach to Information System, Learning to Use Information Systems : New Opportunities with Technology	**3 Hrs**
Unit VIII	Information System in the Enterprise, Major Types of System in Organisation, Systems from Functional Perspectives, **Integrating Functions and Business Processes :** Introduction to Enterprise Application	**3 Hrs**
Unit IX	**Information Systems:** Organisations, Management and Strategy, Organisations and Information Systems, How Information System impact Organisations and Business Firms, The Impact of IT on Management Decision Making, Information Business and Business Strategy	**4 Hrs**
Unit X	**Development of MIS:** Development of Long Range Plans of MIS, Ascertaining the class of Information, Determining the Information Requirement, Development and Implementation of MIS, Management of Quality in MIS, Organization for development of MIS, MIS : the Factors for Success and Failure	**6 Hrs**

References:-
1. Whiteley, D. (2000). E-Commerce, Strategy, Technologies and Applications, London, McGraw Hill.
2. Creating a winning E-Business by Napier, Judd, Rivers, Wagner Course Technology Thomson Learning
3. Management Information Systems, W. S. Jawadekar, 3rd Edition, TMH.
4. Management Information Systems, Loudon and Loudon, 10th Edition, Pearson Educations.
5. Electronic Commerce by Gary P. Schneider Course Technology Thomson Learning
6. Management Information System, James O'Brien, 7th edition, TMH.
7. Information Systems the Foundation of E-Business, Steven Alter, 4th Edition, Pearson Education

MCA405		Elective I					
Subject Code	**Subject Name**	**Teaching Scheme (Contact Hours per week)**			**Credits Assigned**			
		Theory	**Pract**	**Tut**	**Theory**	**Pract**	**Tut**	**Total**
MCA4055	**Human Computer Interface**	04	--	--	04	--	--	04

			Examination Scheme					
Theory				**Term Work**	**Pract**	**Oral**	**Total**
Internal Assessment			**End Sem. Exam. [Once in a semester]**				
Test 1	**Test 2**	**Average**					
20	20	20	80	--	--	--	100

Subject Name	HUMAN COMPUTER INTERFACE
Semester	IV
Objectives	Expose students to the main concept of human computer interaction. Understand main modes of human computer interaction. To apply useful criteria for guiding design and evaluation of user interfaces. To identify and discuss key problems in HCI and its solutions.
Outcomes	Understanding the importance of human factors in developing an interactive system. Acquiring knowledge of design goals and standards of HCI designs

Unit No	Contents	No of. Hrs
Unit I	**The User Interface: Introduction,** Importance of the User Interface, Importance and benefits of Good Design History of Human Computer Interface. Characteristics of Graphical and Web User Interface**:** Graphical User Interface, popularity of graphics, concepts of Direct Manipulation, Graphical System advantage and disadvantage, Characteristics of GUI. Web User Interface, popularity of web, Characteristics of Web Interface, Merging of Graphical Business systems& the Web, Principles of User Interface Design	**7 Hrs**
Unit II	**The User Interface Design Process:** Obstacles and Pitfall in the development Process, Usability, The Design Team, Human Interaction with Computers, Important Human Characteristics in Design, Human Consideration in Design, Human Interaction Speeds, Performance versus Preference, Methods for Gaining and Understanding of Users	**6 Hrs**

Unit III	**Understanding Business Functions:** Business Definitions & Requirement analysis, Determining Business Functions, Design standards or Style Guides, System Training and Documentation	**5 Hrs**
Unit IV	**Principles of Good Screen Design:** Human considerations in screen Design, interface design goals, test for a good design, screen meaning and purpose, Technological considerations in Interface Design System Menus and Navigation Schemes**:** Structure, Functions, Context, Formatting, Phrasing and Selecting, Navigating of Menus, Kinds of Graphical Menus	**7 Hrs**
Unit V	**Windows Interface:** Windows characteristic, Components of Window, Windows Presentation Styles, Types of Windows, Window Management, Web systems	**6 Hrs**
Unit VI	**Device and Screen-Based Control**: Device based controls, Operable Controls, Text entry/read-Only Controls, Section Controls, Combining Entry/Selection Controls, Other Operable Controls and Presentation Controls, Selecting proper controls	**6 Hrs**
Unit VII	**Effective Feedback Guidance and Assistance**: Providing the Proper Feedback, Guidance and Assistance Effective Internationalization and Accessibility**-** International consideration, Accessibility, Create meaningful Graphics, Icons and Images, Colors-uses, possible problems with colors, choosing colors	**8 Hrs**

Instructions for Assignments: Each candidate will submit a journal containing three assignments based on the above syllabus in addition to the 2 unit tests to be held in the semester.

References:
1. Wilbert O. Galitz, "The Essential Guide to User Interface Design", Wiley India Edition
2. Prece, Rogers, "Sharps Interaction Design" , Wiley India.
3. Ben Shneidermann , "Designing the user interface" . 3rd Edition, Pearson Education Asia.
4. SorenLauesen, "User Interface Design" , Pearson Education
5. Alan Cooper, Robert Reimann, David Cronin , "Essentials of Interaction Design", Wiley
6. Alan Dix, Janet Fincay, GreGoryd, Abowd,   Russell,Bealg,"HumanComputer   Interaction", Pearson Education,

L401	Lab I - Core & Advanced JAVA							
Subject Code	**Subject Name**	**Teaching Scheme (Contact Hours per week)**			**Credits Assigned**			
		Theory	**Pract**	**Tut**	**Theory**	**Pract**	**Tut**	**Total**
L401	**Laboratory I – Core & Advanced JAVA**	--	**06**	--	--	**03**	--	**03**

Examination Scheme
End Sem. Exam. [Once in a semester]

Laboratory Name		**Term Work**	**Pract**	**Oral**	**Total**
L401	**Laboratory I – Core & Advanced JAVA**	**25**	**50**	**25**	**100**
	Core JAVA	**15**	**25**	**15**	**55**
	Advanced JAVA	**10**	**15**	**10**	**35**
	Journal/Documentation	--	**10**	--	**10**

Name of Subject	**Laboratory I – Core & Advanced JAVA**
Semester	**IV**
Objectives	1. To prepare students to excel and succeed in industry / technical profession through global, rigorous education. 2. Excellence through application development. 3. To provide students with a solid foundation on Tools, Technology and Framework
Outcomes	1. Students will demonstrate a high degree of proficiency in programming enabling them for careers in software engineering with competencies to design, develop, implement and integrate software applications and computer systems. 2. Students will develop confidence for self education and ability for life-long learning.

| **Unit No**	**Contents**	**No of. Hrs**
Unit I	**Introduction to Java** 1. Program on creation of classes and using different types of function. 2. Program using constructor/function overloading 3. Program on passing Object as parameter to a function 4. Program using static and final variable and methods	**4 Hrs**
Unit II	**Program based on Array , Inheritance and Wrapper Class** 1. Program to perform different operations on Array and String 2. Program using Interface and Inheritances covering domain like	**4 Hrs**

44

educational institute, banking etc.

    3. Program using Wrapper class to cover auto boxing and un boxing

Unit III	**Program on packages and exception Handling**	**4 Hrs**

    1. Program using packages to demonstrate the scope of access specifier
    2. Program to On Exception Handling Mechanism covering (Try,Catch,Throw,Throws,Finally)
    3. Program to create your own exception class

Unit IV	**Program on Applet and multithreading**	**4 Hrs**

    1. Program on dynamic applet creation using image/media etc
    2. Program on Multithreading
    3. Program to create multiply thread doing different task.
    4. Program based on thread priority and thread synchronization

Unit V	**Program on File Handling and JDBC**	**4 Hrs**

    1. Program using IO streams
    2. Program using object serialization and object Deserialization
    3. JDBC : All data base operation using Access /oracle/MySQL as backend

Unit VI	**Program to create rich User interface using various swing component**	**3 Hrs**
Unit VII	**JSP**	**5 Hrs**

    1. Sample program to demonstrate JSP syntax and semantics
    2. Program based on directive and error object
    3. Program based on cookies and Sessions

Unit VIII	**Servlets**	**5 Hrs**

    1. A Simple Servlet Generating Plain text/ HTML
    2. Program based on cross page posting and post back posting (client request and server response)

Unit IX	**EJB(Enterprise Java Beans)**	**5 Hrs**

    1. Program on session, message and entity bean

Unit X	**Introduction to Framework :Struts**	**12 Hrs**

    2. Basic Configuration for struts
    3. Program based on Action validation and control in struts
    4. Program based on integration of JSP and Servlets with struts

Unit XI	**Mini Project in Java**	**10 Hrs**

References:
1. The complete reference JAVA2, Herbert schildt. Tata McGraw Hill
2. Core Java for beginners, Sharanam Shah and vaishali shah, SPD
3. Struts 2 for beginners, Sharanam Shah and vaishali shah, SPD
4. Commercial web development using java 2.0, Ivan Byaross, BPB
4. Struts in Action, Donald Brown, Dreamteach press
5. Java Server Programming java EE6, Black book, Dreamtech press.
6. Core Servlets and Java Server Pages :Vol I: Core Technologies 2/e , Marty Hall and Larry Brown, Pearson
7. Java EE 6 for Server Programming for professionals, Sharnam Shah and vaishali shah, SPD
8. Java 6 Programming, Black Book, Dreamtech Press.
9. Programming with Java A Primer, E.Balaguruswamy Tata McGraw Hill
10. XML Complete Reference, Tata McGraw Hill
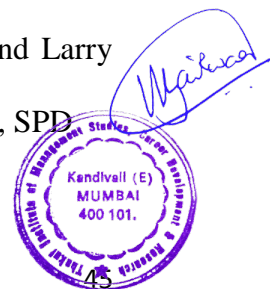
L402		Lab II-ADTA + UML						
Subject Code	**Subject Name**	**Teaching Scheme (Contact Hours per week)**			**Credits Assigned**			
		Theory	**Pract**	**Tut**	**Theory**	**Pract**	**Tut**	**Total**
L402	**Laboratory II – ADTA + UML**	--	**06**	--	--	**03**	--	**03**
Examination Scheme								
End Sem. Exam. [Once in a semester]								

	Laboratory Name	**Term Work**	**Pract**	**Oral**	**Total**
L402	**Laboratory II – ADTA + UML**	25	50	25	100
	ADTA	15	25	15	55
	UML	10	15	10	35
	Journal/Documentation	--	10	--	10

Advanced Database Theory and Applications (ADTA) LAB

Unit No	Contents	No of. Hrs
Unit I	Implementation of different types of Partitions : Range, Hash, List and composite partitions. Distributed Database: Horizontal, Vertical fragmentation and Replication of database and Distributed Query Processing.	**4 Hrs**
Unit II	Implementation of the ETL process.	**4 Hrs**
Unit III	Creation of Star and snowflake schema. Creation of MOLAP and ROLAP cubes.	**4 Hrs**
Unit IV	Implementation of Analytical functions: Rollup, Partial Rollup, Cube, Rank, Dense_Rank, First, Last, Lead, Lag etc	**4 Hrs**
Unit V	Windowing functions: ROWS UNBOUNDED PRECEDING, ROWS BETWEEN n PRECEDING AND n FOLLOWING, CASE EXPRESSION etc Implementation of Bitmap Indexes and Join Indexes.	**4 Hrs**
Unit VI	Implementation of different Data mining algorithms: Association, Classification, Clustering using WEKA/ XLMiner	**4 Hrs**
Unit VII	Implementation of, • Abstract Data Type	**4 Hrs**

46

- Varray
- Nested Tables
- Methods
- Inheritance
- Reference
- Overloading
- Overriding
- Object Views

Unit VIII   Working with multimedia database using a front programming language eg: **4 Hrs**
JAVA.

UML LAB

Name of the Subject	UML LAB
Semester	IV
Objective	1. To provide an understanding of how modeling can be used in practice and where the Unified Modeling Language Notation fit in practical modeling 2. Develop well-documented UML-based artifacts from the early phases of the development process for the case study. 3. To define system domain, system boundaries and system interfaces
Outcome	1. Students will be able to create a Model of the Problem Space and a Model of the Architectural Space using an industrial CASE tool. 2. Students will demonstrate skills for successful participation in a small development team.

Unit No	Contents	No of. Hrs
Unit I	Introduction to UML	2 Hrs
Unit II	Use Case Diagram	2 Hrs
Unit III	Activity Diagram	2 Hrs
Unit IV	Class Diagram	2 Hrs
Unit V	Object Diagram	2 Hrs
Unit VI	Interaction Diagram • Sequence Diagram • Collaboration Diagram	4 Hrs
Unit VII	State Chart Diagram, Composite State Chart Diagram	2 Hrs
Unit VIII	Component Diagram, Deployment Diagram	2 Hrs
Unit IX	Case study	6 Hrs

Instructions for conduction: All practicals are to be performed in any UML CASE tool available e.g. StarUML, Rational Rose, Magic Draw, Net Beans IDE, Microsoft Visio, Eclipse UML2 Tools, Visual Paradigm etc.

Reference Books:
1. Grady Booch, James Rumbaugh, Ivar Jacobson , The Unified Modeling Language User Guide Second edition, Addison Wesley (2005)
2. Michael Blaha, James Rumbaugh, Object-Oriented Modeling and Design with UML, PHI (2005)
3. Tom Pender , UML Bible, Wiley(2003)
4. Craig Larman , Applying UML and Patterns: An introduction to object-oriented analysis and Design and iterative development , Addison Wesley (2004)
5. Grady Booch, Robert A. Maksimchuk, Michael Engle, Bobbi Young, Jim Conallen, Kelli Houston, Object-Oriented Analysis and Design with Applications Third edition, Pearson Education (2008)
6. Joseph Schmuller, Sams Teach Yourself UML in 24 Hours, Sams Publishing (2004)
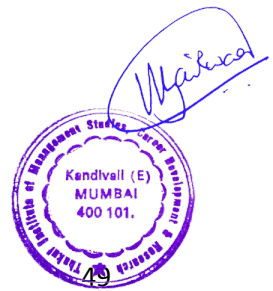
MCA

Semester V

Syllabus

Subject Code	Subject Name	Teaching Scheme (Contact Hours per week)			Credits Assigned			
MCA501	Advanced Web Technology & Dot Net							
		Theory	Pract	Tut	Theory	Pract	Tut	Total
MCA501	Advanced web technology & Dot Net	04	--	--	04	--	--	04

Examination Scheme							
Theory				Term Work	Pract	Oral	Total
Internal Assessment			End Sem. Exam.				
Test 1	Test 2	Average	[Once in a semester]				
20	20	20	80	--	--	--	100

Subject Code   MCA501

**Name   of   Advanced Web Technology and Dot Net
Subject**

Semester   Semester V

Objectives: The course aims to impart the concepts of advanced web programming techniques, provide extension to web technology acquired . Helps to understand basics of server side technologies and apply them to develop dynamic web applications and the DOTNET framework, C# language features and Web development using ASP.NET

Outcomes : Students will learn latest technologies, tools and frameworks. Students will produce well designed standalone as well as dynamic Web applications.The students will know about popular technologies C# , ASP .NET , Ajax, JQuery and latest trends like Semantic web, Web Services, Silverlight

Unit No.	Contents	No. of Hrs
Unit I	**Introduction :** The World Wide Web: WWW Architecture , Web Search Engines , Web crawling ,Web indexing , Web Searching , Search engines optimization and limitations; Introduction to the semantic web(RDF, OWL)	4 Hrs
Unit II	**Introduction to .NET framework :** Evolution of .NET , Comparison of Java and .NET, Architecture of .NET framework , Common Language Runtime ,	5 Hrs

50

Common Type System , Metadata , Assemblies , Application Domains , CFL , Features of .NET , Advantages and Application

Unit III	**C# :** Basic principles of object oriented programming ,,Basic Data Types,Building Blocks- Control Structures,operators,expressions,variables, Reference Data Types- Strings , Data time objects,Arrays,Classes and object,ExceptionHandling,Generics,FileHandling,Inheritance and Polymorphism,Database programming	**8 Hrs**
Unit IV	**Web Applications in ASP.NET :** ASP.Net Coding Modules, ASP.NET Page Directives, Page events and Page Life Cycle , PostBack and CrossPage Posting , ASP.Net Application Compilation models , ASP.NET server Controls , HTML Controls, Validation Controls, Building Databases **Introduction to JQuery :** What is jQuery? JavaScript vsjQuery , How to use jQuery in ASP.NET?	**8 Hrs**
Unit V	**Managing State :** Preserving State in Web Applications , Page-Level State , Using Cookies to Preserve State , ASP.NET Session State , Storing Objects in Session State , Configuring Session State , Setting Up an Out-of-Process State Server , Storing Session State in SQL Server , Using Cookieless Session IDs , Application State	**5 Hrs**
Unit VI	**Introduction to web services :**What is a Web Service? Software as a service , Web Service Architectures , SOA , Creating and consuming Web , XML Web Services, Designing XML Web Services , Creating an XML Web Service with Visual Studio, Creating Web Service Consumers ,Discovering Web Services Using UDDI	**5 Hrs**
Unit VI I	**Advance .NET Concepts :** Introducing WPF , WPF Class Hierarchy , Introducing WCF The WCF Architecture , WCF Endpoints , Introducing WF , Describing Components of WF , Exploring Activities , Describing Types of Workflows , Exploring Built-in Activities , Understanding Bookmark Activities , Handling Runtime Errors ,Hosting Workflows ,Creating a Simple WF Application **Exploring Silverlight** , Architecture of Silverlight , Silverlight Controls in Silverlight Applications, Creating a Simple Silverlight Application Integrating Silverlight with ASP.NET Applications **Introducing AJAX Controls** The ScriptManager Control , The ScriptManagerProxy Control , The Timer Control , The UpdatePanel Control , The UpdateProgress Control	**10 Hrs**

Instructions for Assignments and Tutorials: The Term Work Should consist of two tests, One Presentation/Case Study and six assignments based on the recommended syllabus

51

References:

1. Beginning C# - Wrox Publication
2. Advance .NET Technology second edition by ChiragPatel- DreamTech Press
3. Learning jQuery Third Edition - Jonathan Chaffer and Karl Swedberg , SPD Publication
4. Professional C# 2012 and .NET 4.5- Wrox Publication
5. Internet and Web Technologies, RAJ KAMAL, Tata McGraw Hill
6. .NET programming Black Book
7. Murach's ASP. Net 4. 0 Web Programming with   C# 2010
8. Pro C# 5.0 and the .NET 4.5 Framework – Andrew Trolsen, APress
9. C# with Visual Studio – Vijay Mukhi , BPB
10. Heard First C# Second Edition , O'Reilly
11. Murach's ADO. Net 4 Database Programming with   C# 2010 4th Edition
12. Web Technologies Black book , DreamTech Press
13. Developing Web Application- Second Editon - Ralph Moseley & M. T. Savaliya, Wiley
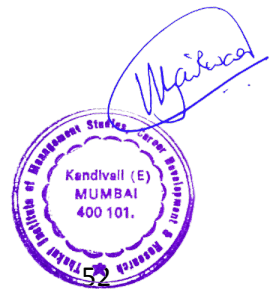
| MCA502		Wireless & Mobile Technology						
Subject Code	**Subject Name**	**Teaching Scheme** **(Contact Hours per week)**			**Credits Assigned**			
		Theory	Pract	Tut	Theory	Pract	Tut	Total
MCA502	**Wireless & Mobile Technology**	04	--	--	04	--	--	04
Examination Scheme								
Theory					**Term Work**	**Pract**	**Oral**	**Total**
Internal Assessment			**End Sem. Exam.** **[Once in a semester]**					
Test 1	Test 2	Average						
20	20	20	80		--	--	--	100

Subject Code MCA502

Name of Subject Wireless & Mobile Technology

Semester Semester V

Objectives: The course aims to impart the concepts of wireless communication techniques, provide extension to communications fundamentals acquired. Helps to understand basics of mobile environment and the technology in the various wireless communications

Outcomes : Students will learn wireless technologies, tools and frameworks which will help them to understand the mobile and the other wireless communications.

Unit No	Contents	No. of Hrs
Unit I	**Introduction To Wireless Technology :** Mobile and wireless communications , Applications, history, market vision, overview Frequency of Radio Transmission, Signal Antennas, Signal Propagation , Multiplexing, Modulation, Spread Spectrum , Coding and Error Control (Convolution Codes)	5 Hrs
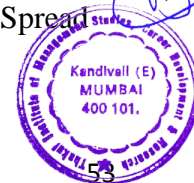
Unit II	**Wireless Communication** : Cellular systems- Frequency Management and Channel Assignment, Dropped call rates & their evaluation,CDMA – FDMA – TDMA – CSDMA , Generations of Cellular Networks 1G,2G,2.5G,3G and 4G	**6 Hrs**
Unit III	**Wireless Lan :** IEEE 802.11,WiFi, IEEE 802.16 ,Bluetooth, WIMAX , Standards – Architecture – Services	**8 Hrs**
Unit IV	**Mobile Communication Systems :** GSM-architecture-Location tracking and call setup- Mobility management- Handover-Security-GSM SMS , International roaming for GSM- call recording functions-subscriber and service data mgt - Mobile Number portability - VoIP service for Mobile Networks , GPRS – Architecture-GPRS procedures-attach and detach procedures-PDP context procedure-combined RA/LA update procedures-Billing	**8 Hrs**
Unit V	**Mobile Network Layer :** Mobile IP – Dynamic Host Configuration Protocol, Mobile Ad Hoc Routing Protocols– Multicast routing	**6 Hrs**
Unit VI	**Mobile Transport Layer :** TCP over Wireless Networks – Indirect TCP – Snooping TCP –Mobile TCP – Fast Retransmit / Fast Recovery Transmission/Timeout Freezing-Selective Retransmission – Transaction Oriented TCP , TCP over 2.5 / 3G wireless Networks	**6 Hrs**
Unit VII	**Application Layer :** WAP Model- Mobile Location based services -WAP Gateway –WAP protocols – WAP user agent profile, Caching model-wireless bearers for WAP - WML – WMLScripts – WTA - iMode- SyncML	**6 Hrs**

Instruction forAssignments and Tutorials:

The Term Work Should consist of two tests, One Presentation/Case Study and six assignments based on the recommended syllabus

Reference Books

1. Jochen Schiller, "Mobile Communications", Second Edition, Pearson Education
2. William Stallings, "Wireless Communications and Networks", Pearson Education
3. Vijay Garg, "Wireless network evolution: 2G to 3G", Prentice Hall, 2002.
4. MISRA "Wireless Communication and Networks: 3G and Beyond", McGraw Hill
5. Principles of mobile computing and mobile communications by Melizza Othman CRC press
6. 802.11 Wireless Networks: The Definitive Guide , 2nd Edition Matthew Gast, O'Reilly
7. Handbook of Wireless Networks and Mobile Computing, Ivan Stojmenovic, Wiley India Edition
8. Wireless and Mobile Network Architectures Yi-Bing Lin, ImrichChlamtac
9. Wireless and Mobile Networks: Concepts and Protocols, Dr. Sunilkumar S. Manvi S.Kakkasageri

54

MCA503		Soft Computing						
Subject Code	**Subject Name**	**Teaching Scheme** **(Contact Hours per week)**			**Credits Assigned**			
		Theory	Pract	Tut	Theory	Pract	Tut	Total
MCA503	**Soft Computing**	04	--	--	04	--	--	04
	Examination Scheme							
Theory					**Term Work**	**Pract**	**Oral**	**Total**
Internal Assessment			**End Sem. Exam.** **[Once in a semester]**					
Test 1	Test 2	Average						
20	20	20	80		--	--	--	100

Name of Subject   **Soft Computing**

Semester   **V**

Objectives   To teach MCA students fundamental concepts of soft computing, to make them understand Artificial Neural Network, Fuzzy Logic, Classical Sets and Fuzzy Sets, Genetic Algorithm, Applications of Soft Computing

Outcomes   Understanding fundamental concepts of Soft Computing. Students should be able to apply Fuzzy Logic, Classical Sets and Fuzzy Sets, Genetic Algorithm on applications

Students should be able to apply Soft Computing concepts on Applications

Unit No	Contents	No of. Hrs
Unit I	**Introduction to Soft Computing:** Evolution of Computing - Soft Computing Constituents – From Conventional AI to Computational Intelligence - Machine Learning Basics	**2 Hrs**

| **Unit II** | **Artificial Neural Network: Introduction,** Fundamental Concept, Artificial Neural Network, Biological Neural Network, Brain vs. Computer - Comparison Between Biological Neuron and Artificial Neuron (Brain vs. Computer), Evolution of Neural Networks, Basic Models of Artificial Neural Network | **6 Hrs** |

Supervised Learning Network- Perceptron Networks, Adaptive Linear Neuron (Adaline), Multiple Adaptive Linear Neurons, Back-Propagation Network, back propogation learning methods, effect of learning rule co-efficient ;back propagation algorithm, factors affecting backpropagation training, **Associative Memory Networks, Unsupervised Learning Networks, Special Networks**

| **Unit III** | **Introduction to Fuzzy Logic, Classical Sets and Fuzzy Sets,** Introduction to Fuzzy Logic, Classical Sets (Crisp Sets),Fuzzy Sets | **3 Hrs** |

| **Unit IV** | **Classical Relations and Fuzzy Relations:** Introduction, Cartesian Product of Relation, Classical Relation, Fuzzy Relations | **4 Hrs** |

| **Unit V** | **Membership Functions:** Introduction, Features of the Membership Functions, Fuzzification, Methods of Membership Value Assignments | **3 Hrs** |

| **Unit VI** | **Defuzzification:** Introduction, Lambda-Cuts for Fuzzy Sets (Alpha-Cuts), Lambda-Cuts for Fuzzy Relations, Defuzzification Methods | **3 Hrs** |

| **Unit VII** | **Fuzzy Arithmetic and Fuzzy Measures:** Introduction, Fuzzy Arithmetic- Interval Analysis of Uncertain Values, Fuzzy Numbers, Fuzzy Ordering, Fuzzy Vectors, Extension Principle, Fuzzy Measures- Belief and Plausibility Measures, Probability Measures, Possibility and Necessity Measures, Measures of Fuzziness, Fuzzy Integrals | **4 Hrs** |

| **Unit VIII** | **Fuzzy Rule Base and Approximate Reasoning:** Introduction,Truth Values and Tables in Fuzzy Logic, Fuzzy Propositions, Formation of Rules, Decomposition of Rules (Compound Rules), Aggregation of Fuzzy Rules, Fuzzy Reasoning (Approximate Reasoning)- Categorical Reasoning, Qualitative Reasoning, Syllogistic Reasoning, Dispositional Reasoning, Fuzzy Inference Systems (FIS)- Construction and Working Principle of FIS, Methods of FIS,Overview of Fuzzy Expert System | **4 Hrs** |

| **Unit IX** | **Fuzzy Decision Making:** Introduction, Individual Decision Making, Multiperson Decision Making, Multiobjective Decision Making, Multiattribute Decision Making, Fuzzy Bayesian Decision Making, **Fuzzy Logic Control Systems-** Introduction, Control System Design, Architecture and Operation of FLC System, FLC System Models, Application of FLC Systems | **3 Hrs** |

| **Unit X** | **Genetic Algorithm:** Basic concepts, Difference between genetic algorithm and traditional methods, Simple genetic algorithm, Similarity templates, Working principle, Procedures of GA, Genetic operators- reproduction, Mutation, crossover, | **4 Hrs** |
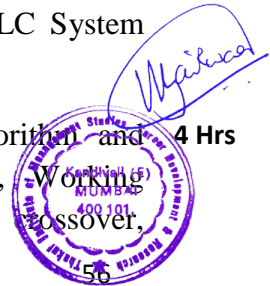
basic building block hypothesis, the two-armed and k-armed bandit problem, Minimal deceptive problem, Applications

Unit XI	**Applications of Soft Computing:** Introduction, A Fusion Approach of Multispectral Images with SAR (Synthetic Aperture Radar) Image for Flood Area- Image Fusion, Neural Network Classification, Methodology and Results, Optimization of Traveling Salesman Problem using Genetic Algorithm Approach- Genetic Algorithms, Schemata, Problem Representation, Reproductive Algorithms, Mutation Methods, Results, Genetic Algorithm-Based Internet Search Technique- Genetic Algorithms and Internet, First Issue: Representation of Genomes, Second Issue: Definition of the Crossover Operator, Third Issue: Selection of the Degree of Crossover, Fourth Issue: Definition of the Mutation Operator, Fifth Issue: Definition of the Fitness Function, Sixth Issue: Generation of the Output Set, Soft Computing Based Hybrid Fuzzy Controllers- Neuro-Fuzzy System, Real-Time Adaptive Control of a Direct Drive Motor, GA-Fuzzy Systems for Control of Flexible Robots, GP-Fuzzy Hierarchical Behavior Control, GP-Fuzzy Approach,Soft Computing Based Rocket Engine Control- Bayesian Belief Networks, Fuzzy Logic Control, Software Engineering in Marshall's Flight Software Group, Experimental Apparatus and Facility Turbine Technologies SR-30 Engine, System Modifications, Fuel-Flow Rate Measurement System, Exit Conditions Monitoring	**9 Hrs**

Instructions forAssignments and Tutorials:

The Term Work Should consist of two tests, One Presentation/Case Study and six assignments based on the recommended syllabus

References:

1. Dr. S. N. Sivanandam and Dr. S. N. Deepa,"Principles of Soft Computing "John Wiley
2. S. Rajsekaran& G.A. VijayalakshmiPai, "Neural Networks,Fuzzy Logic and Genetic Algorithm:Synthesis and Applications" Prentice Hall of India.
3. N.P.Padhy, "Artificial Intelligence and Intelligent Systems" Oxford University Press.
4. SimanHaykin, "Neural Netowrks"Prentice Hall of India
5. imothy J. Ross, "Fuzzy Logic with Engineering Applications" Wiley India.
6. Kumar Satish, "Neural Networks" Tata McGraw Hill

MCA504		Distributed computing and Cloud Computing							
Subject Code	**Subject Name**	**Teaching Scheme** **(Contact Hours per week)**			**Credits Assigned**				
		Theory	Pract	Tut	Theory	Pract	Tut	Total	
MCA504	**Distributed computing and Cloud Computing**	04	--	--	04	--	--	04	

Examination Scheme								
Theory				**Term Work**	**Pract**	**Oral**	**Total**	
Internal Assessment			**End Sem. Exam.** **[Once in a semester]**					
Test 1	Test 2	Average						
20	20	20	80	--	--	--	100	

Name of Subject	**Distributed Computing and Cloud Computing**
Semester	**Semester V**
Objectives	To introduce distributed computing concepts , To elaborate on the design techniques and constraints, and to analyze the latest trends in distributed systems like Service Oriented Architectures and cloud computing
Outcomes	The students would know about existing distributed systems, latest trends like SOA and cloud will be introduced, and students will know about popular cloud technologies like Amazon, Google and Microsoft

Unit No	Contents	No of. Hrs
Unit I	**Introduction to Distributed Computing Concepts**	3 hrs
	Basic concepts of distributed systems, distributed computing models, software concepts, issues in designing distributed systems, client server model and current case studies of the World Wide Web 1.0 and World Wide Web 2.0.	
Unit II	**Inter Process Communication**	5 hrs
	Fundamental concepts related to inter process communication including message-passing mechanism, a case study on IPC in MACH, concepts of group communication and case study of group communication CBCAST in ISIS, API for Internet Protocol	

58

Unit III	**Formal Model Specifications and Remote Communication**	**5 hrs**

Basic concepts of formal model definitions, Different types of communication systems, algorithms for message passing systems, Basic concept of middleware, Remote Procedural Call (RPC), a case study on Sun RPC, Remote Method Invocation (RMI) along with a case study on Java RMI.

Unit IV	**Clock synchronization**	**3 hrs**

clock synchronization, physical and logical clocks, global state mutual Exclusion algorithms, election algorithms.

Unit V	**Distributed System Management**	**5 hrs**

Resource management, process management, threads, and fault tolerance

Unit VI	**Distributed Shared Memory**	**5 hrs**

Fundamental concepts of DSM, types of DSM, various hardware DSM systems, Consistency models, issues in designing and implementing DSM systems ,

Unit VII	**Distributed File System**	**4 hrs**

Concepts of a Distributed File System (DFS), file models, issues in file system design , naming transparency and semantics of file sharing, techniques of DFS implementation,

Unit VIII	**Advances in Distributed Computing (SOA & Cloud Computing)**	**4 hrs**

Service-Oriented Architecture, Elements of Service-Oriented Architectures, RPC versus Document Orientation, Major Benefits of Service- Oriented Computing, Composing Services, Goals of Composition, Challenges for Composition, Spirit of the Approach

Unit IX	**Fundamentals of Cloud computing**	**2 hrs**

Evolution of Cloud Computing ,cluster computing Grid computing, Grid computing versus Cloud Computing, Key Characteristics of cloud computing

Unit X	**Cloud models**	**4 hrs**

Benefits of Cloud models, Public Cloud, Private Cloud, Hybrid Cloud, Community Cloud, Shared Private Cloud, Dedicated Private Cloud, Dynamic Private Cloud, Savings and cost impact

Web services delivered from cloud, Platform as a service, Software as a service, Infrastructure as a service

Unit XI   Cloud Security Fundamentals   **5 hrs**

   Privacy and security in cloud, Security architecture , Data security, Identity and access management, security challenges

Unit XII   Implementation of Cloud Technologies

   Introduction to Cloud Technologies, Hypervisor, Web services, AJAX , MASHUP, Hadoop, Map reduce, Virtualization Technologies, Virtual Machine Technology Cloud data centre, Case studies : Google, Microsoft, Amazon

Instructions forAssignments and Tutorials:

The Term Work Should consist of two tests, One Presentation/Case Study and six assignments based on the recommended syllabus

Reference books:

1. Distributed Computing by Dr. SunitaMahajan , Seema Shah, Oxford University Press
2. Distributed Operating Systems by Tanenbaum S, Pearson Education
3. Distributed OS by Pradeep K. Sinha , PHI
4.   Distributed Systems concepts and design by George Coulouris, Jean Dollimore, Tim Kindberg, Addison-Wesley
5. Cloud Computing a Practical Approach by Anthony T. Velte, Robert Elsenpeter, TMH
6. Cloud Computing insights into new-era infrastructure by Dr. Kumar Saurabh, Wiley India
7. Cloud Computing implementation, management and security by John W. Rittinghouse, James F. Ransome, CRC Press, Taylor & Francis group, 2010.
8. Distributed Computing Architecture by Shivanandan
9. Cloud Application Architecture by George Reese, O'reilly and associates

Subject Code		Elective II							

Subject Code	Subject Name	Teaching Scheme (Contact Hours per week)			Credits Assigned			
		Theory	Pract	Tut	Theory	Pract	Tut	Total
MCA5051	Cyber Security	04	--	--	04	--	--	04

Examination Scheme							
Theory				Term Work	Pract	Oral	Total
Internal Assessment			End Sem. Exam. [Once in a semester]				
Test 1	Test 2	Average					
20	20	20	80	--	--	--	100

Name of Subject Cyber Security

Elective II

Semester V

Objectives Securing vital resources and information in the network is the most challenging feat for system enterprise. Develop an understanding of information assurance as practiced in computer operating systems, distributed systems, networks and representative applications.Gain familiarity with prevalent network and distributed system attacks, defenses against them.Develop a basic understanding of cryptography, how it has evolved, and some key encryption techniques used today.Develop an understanding of security policies (such as authentication, integrity and confidentiality), as well as protocols to implement such policies in the form of message exchanges.

Outcomes Knowledge about the technical andlegal terms relating to thecybersecurity , cyber offences and crimes. Gain an insight to the Indian Act 2000 and the organizational implications of cyber Security

Unit No	Contents	No of. Hrs

Unit I **Introduction to Cybercrime** 4Hrs

Cybercrime definition and origins of the world, Cybercrime and information security, Classifications of cybercrime,

| **Unit II** | **ITA 2000 :** Cybercrime and the Indian ITA 2000, A global Perspective on cybercrimes | **4 hrs** |

| **Unit III** | **Cyberoffenses& Cybercrime: Issues and challenges** | **12 hrs** |

How criminal plan the attacks, Social Engg, Cyber stalking, Cybercafe and Cybercrimes, Botnets, Attack vector, Cloud computing,Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit Card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Registry Settings for Mobile Devices, Authentication Service Security, Attacks on Mobile/Cell Phones, Mobile Devices:Security Implications for Organizations, Organizational Measures for Handling Mobile, Devices-Related Security Issues, Organizational Security Policies and Measures in Mobile Computing Era, Laptops

Internet Filtering Encryption issues, Internet Gambling, Spam - Unsolicited Junk E-mail, Digital Signatures, Anti-Spam Laws, Anti-Spam Suits, What is Cyber squatting? Ant cyber squatting, Software Piracy, Domain Name Disputes, File Sharing ,

| **Unit IV** | **Tools and Methods Used in Cyberline :** | **6 hrs** |

Proxy Servers and Anonymizers, Phishing, Password Cracking, Keyloggers and Spywares, Virus and Worms, Steganography, DoSDDoS Attacks, SQL Injection, Buffer Over Flow, Attacks on Wireless Networks, Phishing, Identity Theft (ID Theft)

| **Unit V** | **Cybercrimes and Cybersecurity: The Legal Perspectives** | **6 hrs** |

Why do we need Cyberlaw: The Indian Context, The Indian IT Act, Digital Signature and the Indian IT Act, Amendments to the Indian IT Act, Cybercrime and Punishment, Cyberlaw, Technology and Students: Indian Scenario

| **Unit VI** | **Cybersecurity: Organizational Implications** | **8 hrs** |

Cost of Cybercrimes and IPR Issues:Lesson for Organizations, Web Treats for Organizations: The Evils and Perils, Security and Privacy Implications from Cloud Computing, Social Media Marketing:Security Risk and Perils for Organization, Social Computing and the Associated Challenges for Organizations, Protecting People's Privacy in the Organization,Organizational Guidelines for Internet Usage, Safe Computing Guidelines and Computer Usage Policy, Incident Handling: An Essential Component,Intellectual Property in the Cyberspace of Cybersecurity, Importance of Endpoint Security in Organizations

| **Unit VII** | **Cyber Acts and related issues** | **5 Hrs** |

Children's Online Privacy Protection Act (COPPA), The Children's Internet Protection Act (CIPA Sexual Predator Laws), The Child Online Protection Act (COPA) , The Communications Decency Act (CDA), Electronic Signatures in Global

62

& National Commerce Act (E-Sign),

Instructions forAssignments and Tutorials:

The Term Work Should consist of two tests, One Presentation/Case Study and six assignments based on the recommended syllabus

References::

1. Nina Godbole, SunitBelapure, Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Wiley India, New Delhi
2. KAHATE ,"Cryptography and Network Security", TMH
3. Information Systems Security, Nina Godbole, Wiley India, New Delhi
4. Cybersecurity: The Essential Body of Knowledge, Dan Shoemaker, William Arthur Conklin, Wm Arthur Conklin, Cengage Learning.
5. Cyber Security, Edward Amoroso, Silicon Press, First Edition
6. Cyber Security &Global Information Assurance,Kennetch J. Knapp, Information Science Publishing.
7. William Stallings, Cryptography and Network Security, Pearson Publication
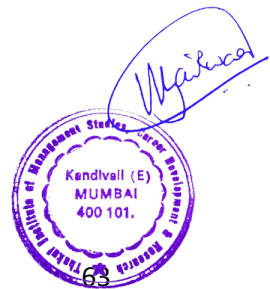
MCA505			Elective II						
Subject Code	**Subject Name**		**Teaching Scheme** (Contact Hours per week)			**Credits Assigned**			
			Theory	Pract	Tut	Theory	Pract	Tut	Total
MCA5052	**Multimedia Technology**		04	--	--	04	--	--	04
Examination Scheme									
Theory						**Term Work**	**Pract**	**Oral**	**Total**
Internal Assessment			**End Sem. Exam.** [Once in a semester]						
Test 1	Test 2	Average							
20	20	20	80			--	--	--	100

Name of Subject   **Multimedia Systems**

Semester   **V**

Objectives   Students should be aware of multimedia system, its characteristics, properties, architecture, applications in different fields.Students should know various elements, objects, medium of mu Students should understand importance of compression and decompression methods, should be aware with standard compression techniques like JEPG & JPEG 2000 for still images ,MPEG and its variation for Video and Audio.Students should know various file formats for text, image, audio & video. In terms of audio, they should be aware with MIDI, MP3, WAV format which we use in day to day life.Students should know latest multimedia applications like Animation, Virtual Reality, Knowledge based multimedia systems.

Outcomes   Students will be aware of multimedia system, its characteristics, properties, architecture, applications in different fields, its various elements, objects, medium. Students understood compression and decompression methods, techniques like JEPG& JPEG 2000 for still images, MPEG and its variation for Video and Audio. Students shall understand what is authoring system, need of authoring system, choosing of authoring system depending on application type, user interface issues. Student will be aware of Copyright Act, various methods of licensing. Students will be aware of latest multimedia applications like Animation, Virtual Reality, Knowledge based multimedia systems

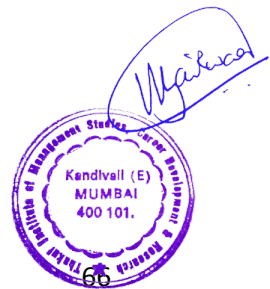| Unit No	Contents	No of. Hrs
Unit I	**Introduction** to Multimedia: Definition and Scope of Multimedia, its Components & applications, Interactive Multimedia, Multimedia Growth, Multimedia Advantages & disadvantages. Major categories of Multimedia titles. Multimedia Products, Kiosk, Multimedia in Public place, Multimedia on Web,Multimedia in business. Multimedia in mobile phones, iPod, Hypermedia and Hypertext. Hypermedia Applications.	**6 Hrs**
Unit II	**Graphics & Text**: Graphics: Bitmap Graphics, Vector Graphics, Image file format, GIF vs. JPEG, Graphics image sources, Graphics on internet. Graphic programs feature. Animation: Principals of animations, Animation types & technique , Applications of Animation , Morphing , Warping,Animation file and formats, Text: Text in multimedia Applications, General guidelines ,Designing and use of text , working with text, Text fonts, Menus and Navigation, Font editing drawing tools.	**7 Hrs**
Unit III	**Sound , Audio and Video :** Multimedia system sounds , Sound, Sound file formats, MIDI, MIDI Messages, MIDI Vs Digital Audio, sound on Internet, Adding sound & video to your multimedia project, Analog display standards, Digital display standards, Digital video Basics , Video recording and tap formats , Video on internet, Difference between computer , TV and Video, Optimizing video files for CD-Rom.	**7 Hrs**
Unit IV	**Multimedia Authoring Tools**: Making instance multimedia, Types of Authoring tools, Time based authoring tools, card and page based authoring tools, Icon and object based authoring tools, Authoring Vs Presentation, Story boarding, Graphic design principle for PowerPoint, Development process for Multimedia Applications, Contents analysis for different applications.	**5 Hrs**
Unit V	**Designing and Producing**: Designing, designing the structure of multimedia, Different types of Multimedia structure. Hot spots, Buttons, User interface analysis & Design: Rules of user interface design, models of user interface design, User interface Analysis & Elements of user interface, User interface design, User interface evaluation &examples.Delivering: Testing, Preparing of delivery.	**6 Hrs**
Unit VI	**Planning and costing:** The process of making multimedia & multimedia skills, multimedia skills team, Planning & costing: Project planning, scheduling & costing, Idea analysis, Idea management software, Pre testing, Task planning, Building a Team, Prototype, Multimedia project team roles. Development: Alpha Development, Beta Development.	**7 Hrs**
Unit VII	**Coding and Compression**: Introduction to coding and compression techniques	**7 Hrs**
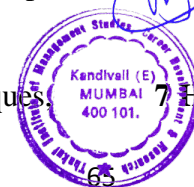
Entropy encoding, run length, Arithmetic encoding, Huffman, LimpelZiv encoding, JPEG compression process, MPEG audio and video compression, Various CD Formats ,MPEG Standards.

Instructions forAssignments and Tutorials:

The Term Work Should consist of two tests, One Presentation/Case Study and six assignments based on the recommended syllabus

References :

1. Multimedia Madness, RonWodaski , SAMS pub.
2. Multimedia : Making it works, Tay Vaughan , TMH pub
3. Multimedia Communication –Rao, Wiley -Dreamtech
4. Multimedia System : S.K. Triphathi, S. V. Raghvan
5. Mutimedia System Design, P.K. AndleighKthakar, Prentice hail of India
6. Multimedia System , J.E.K Budford , Addision Wesley.

MCA505		Elective II						

Subject Code	Subject Name	Teaching Scheme (Contact Hours per week)			Credits Assigned			
		Theory	Pract	Tut	Theory	Pract	Tut	Total
MCA5053	Information Security and Audit	04	--	--	04	--	--	04

Examination Scheme							
Theory				Term Work	Pract	Oral	Total
Internal Assessment			End Sem. Exam. [Once in a semester]				
Test 1	Test 2	Average					
20	20	20	80	--	--	--	100

Name of Subject   Information Security and Audit

   Elective II

Semester   V

Objectives   The subject aims to learn about the theory underlying computer-security.. The emphasis is on network security appliances and networking infrastructure such as firewalls, access control, secure network design and Virtual Private Networks.

Outcomes   On successful completion of this subject students will be able to describe the theoretical aspects of computer security with an in-depth focus on modern network security threats. Design, configure, test, manage, monitor and support network security infrastructure devices. And network security theory into practice using industry based techniques, processes and standards.

Unit No	Contents	No of. Hrs

Unit I   **Security Principles and Practices:**   **5 hrs**

   Information System Security Principles, Threats and Attacks, Classification of threats and assessing damages, Protecting Information Systems Security,

   Information System Security Engineering Process

Security Policies, standards, Guidelines and Procedures

Unit II	**Data and Program Security:**	**6 hrs**

Data Protection, End Point security, Physical Security, Insider threats and data Protection

Secure programs, Non-malicious program errors, malicious code, Targeted malicious code, Controls against program threats

Unit III	**Operating System Security:**	**4 hrs**

Role of Operating systems in Information systems applications, Operating systems Security, Patched Operating systems, Protected Objects and Methods of Protection, Memory Address Protection, Control of Access to General Objects, File Protection Mechanism

Unit IV	**Database Security :**	**4 hrs**

Database Security Requirements and Challenges, Database Integrity, Data Security Policies, Sensitive data, Interface, Multilevel database

Application Software Controls :Concurrency Control, Cryptograph control, Audit train control.

Unit V	**Steganography and Digital Forensics:**	**3 hrs**

Steganography- Overview and Principles, need of steganography, pros and cons, Steganography vs Cryptography, Types of Steganography

Digital Forensics- Introduction, Forensic life cycle,Water marking.

Unit VI	**Laws, & Legal Framework for Information Security:**	**5 hrs**

Introduction, Information Security and Law, Understanding the Laws of Information Security, Indian IT Act, Laws of IPR, Patent laws, Copyright Law, Case Study

Ethical Issues in Information Security: Introduction, Issues in Network enterprises, Computer Ethics and Security and Privacy Policies, Case study

Unit VII	**Software Web Services Security :**	**5 hrs**

Technologies for web services (XML, SOAP, WSDL & UDDI), Web Services Security – Token types, XML encription, XML segment.

UnitVIII	**Secutiry of Wireless Networks:**	**4 hrs**

An overview of wireless technology, Wired world versus wireless world, putting....

68

Wireless Networks in Information Security Context,Attacks on Wireless Networks

Unit IX   Auditing for Security: **9 hrs**

Introduction, Organizations Roles and Responsibilities for Security Audits, Auditors Responsibilities for Security Audits, Types of Security Audits, Technology Based Audits, Phases in Security Audits, Budgeting for Security Audits.

Instructions forAssignments and Tutorials:

The Term Work Should consist of two tests, One Presentation/Case Study and six assignments based on the recommended syllabus

References:

1. Nina Godbole, "Information Systems Security", Wiley India
2. Eric Cole, "Network Security Bible", Wiley India Edition
3.
4. C. P. Pfleeger, and S. L. Pfleeger, "Security in Computing", Pearson Education.
5. Matt Bishop, "Computer Security: Art and Science", Pearson Education.
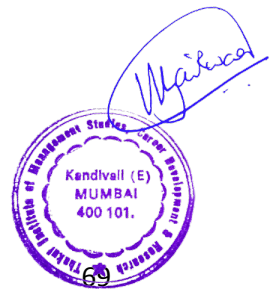
MCA505		Elective II						

Subject Code	Subject Name	Teaching Scheme (Contact Hours per week)			Credits Assigned			
		Theory	Pract	Tut	Theory	Pract	Tut	Total
MCA5054	Bioinformatics	04	--	--	04	--	--	04

Examination Scheme								
Theory				Term Work	Pract	Oral	Total	
Internal Assessment			End Sem. Exam.					
Test 1	Test 2	Average	[Once in a semester]					
20	20	20	80	--	--	--	100	

Name of Subject	**Bioinformatics**
Semester	V
Objectives	To impart knowledge on introduction and historical and academic perspective to the field of bioinformatics, To learn the key methods and tools used in bioinformatics, and the influence of biological science on computing science
Outcomes	The student should be able to Understand the theoretical basis behind bioinformatics Communicate about essential and modern biology and how it relates to Informatics and explore the tools and techniques used in Bioinformatics

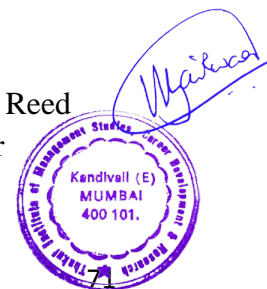| Unit No	Contents	No of. Hrs
Unit I	What is Bioinformatics? , Bioinformatics as multidisciplinary domain , Goal and scope of bioinformatics , Future prospectus of bioinformatics , Use of computers to biologists	**4 Hrs**
Unit II	Biological research on the web, Public biological databases : Primary sequence database, Protein sequence databases , Secondary databases , Protein pattern databases , Searching biological databases- depositing data into public databases	
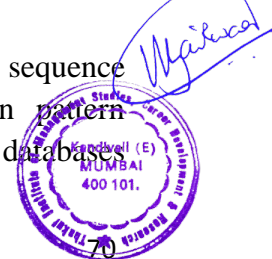
| | Finding software , Judging the quality of information | **6 Hrs** |

Unit III Introduction to Protein structure , Chemistry of proteins : 1D to 3D , Peptide bond, Amino Acid

Web based protein structure tools : Structure visualization , Cn3D, RasMol

Structure modeling , MolMol , JMol

9 Hrs

Structure classification : Types of classification, Databases (SCOP,CATH)

Structure alignment : Comparing two structures (ProFit)

Structure analysis : ProCheck

Unit IV Composition of DNA and RNA , Watson and Crick Solve the Structure of DNA, **6 Hrs** Importanace and features of DNA sequence analysis , Development of DNA Sequencing Methods, Genefinders and Feature Detection in DNA ,

Unit V Pairwise Sequence Comparison, Pairwise Sequence alignemnt methods : Dot plot , **9 Hrs** Dynamic programming , Local and Global similarities , Word and K-tuple , BLAST , FASTA, Multiple sequence alignment methods : Progressive , ClustalW , Iterative , DiAlign

Unit VI Phylogenetic Analysis : Phylogenetic Trees Based on Pairwise Distances, Phylogenetic Trees Based on Neighbor Joining, Phylogenetic Trees Based on Maximum Parsimony , Phylogenetic Trees Based on Maximum Likelihood **6 Hrs** Estimation Introduction to motif

Unit VII Automating data analysis using Perl , Perl basics , Pattern matching and regular **5 Hrs** expressions , Parsing BLAST output using Perl

Instructions forAssignments and Tutorials:

The Term Work Should consist of two tests, One Presentation/Case Study and six assignments based on the recommended syllabus

References:

1. Developing Bioinformatics Computer Skills by Cynthia Gibas, Per Jambeck, O'Reilly
2. Introduction to Bioinformatics by T K attwood& D J Parry-Smith, Addison Wesley Longman
3. Bioinformatics A beginners Guide-Machael, Wiley-Dreamtech
4. Biotechnology: a multi-volume comprehensive treatise Volume 5b by Rehm and Reed
5. An Introduction to Bioinformatics Algorithms by Neil C. Jones,Pavel A. Pevzner

MCA505		Elective II						
Subject Code	**Subject Name**	**Teaching Scheme** **(Contact Hours per week)**			**Credits Assigned**			
		Theory	**Pract**	**Tut**	**Theory**	**Pract**	**Tut**	**Total**
MCA5055	**Software Quality Assurance**	04	--	--	04	--	--	04
Examination Scheme								
Theory					**Term Work**	**Pract**	**Oral**	**Total**
Internal Assessment			**End Sem. Exam.** **[Once in a semester]**					
Test 1	**Test 2**	**Average**						
20	20	20	80		--	--	--	100

Name of Subject	**Software Quality Assurance**
Semester	V
Objectives	To give a focus on concept of quality its models and improvements, guidance on measuring quality and metrics and quality management system through its elements. It focuses on principles and practices in quality management system and gives guidance on measure and metrics in process and product domain of quality
Outcomes	The students gets knowledge on software quality, its model and improvements, in-depth knowledge on measuring quality, knowledge on quality management system and on principles and practices of QMS

Unit No	**Contents**	No of. Hrs
Unit I	**Fundamentals Of Software Quality Engineering**	**9 Hrs**
	Concepts of Quality-Hierarchical Modeling- Quality Models- Quality Criteria And its Interrelation –Fundamentals of Software Quality Improvement-Concepts of Process Maturity- Improving Process Maturity	

Unit II	Development In Measuring Quality	9 Hrs

Selecting Quality Goals And Measures-Principles Of Measurement-Measures And Metrics-Quality Functional Deployment-Goal/Question/Measures Paradigm- Quality Characteristics Tree-The FURPS Model And FURPS-Gilb Approach- Quality Prompts

Unit III	Quality Management System	9 Hrs

Element Of A Quality Engineering Program- Quality Control , Assurance And Engineering- Reliability, Maintainability, Verifiability, Testability, Safety And Supportability- Historical Perspective Element Of QMS-Human Factors-Time Management-QMS For Software- Quality Assurance-ISO9000 Series- A Generic Quality Management standard-Tools For Quality

Unit IV	Principles And Practices In Qms	9 Hrs

Process-Product-Project-People In Software Development And Management Spectrum-Principle And Critical Practices In QMS-ISO 9001And Capability Maturity Models-Six Sigma, Zero Defects And Statistical Quality Control.

Unit V	Measures And Metrics In Process And Project Domain	9 Hrs

Key Measures For Software Engineers-Defects- Productivity And Quality-Measuring And Improving The Development Process- Assigning Measures To Process Elements And Events- Isikawa Diagrams- Metrics For Software Quality – Integrating Metric Within Software Engineering Process-Metrics For Small Organization

Instructions forAssignments and Tutorials:

The Term Work Should consist of two tests, One Presentation/Case Study and six assignments based on the recommended syllabus

References:

1. Brian Hambling " Managing Software Quailty", Tata McGraw Hill
2. Juran. J.M.Franks, M.Gyrna, "Quality Planning and Analysis(from the product development through use)",Tata McGraw Hill
3. Alcon Gillies" Software Quality: Theory and Mangement", International Thomson, Computer Press 1997.
4. Software Testing Quality Assurance-Naik –Tripathi, Wiley -Dreamtech
5. Stephan H.Kan, "Metric and Model in Software Quality Engineering", Addison Wesley, 1995.
6. Roger S. Pressman, "Software Engineering – A Practitioner's Approach", Fifth Edition ,McGraw Hill, 2001
7. Humphrey Watts," Managing the Software Process", Addison Wesley,1986.
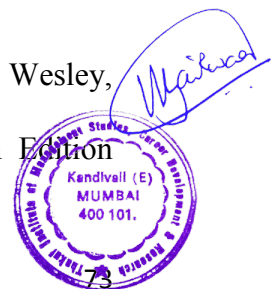
L501	Laboratory I -AWT + Dot Net							
Subject Code	**Subject Name**	**Teaching Scheme** (Contact Hours per week)			**Credits Assigned**			
		Theory	**Pract**	**Tut**	**Theory**	**Pract**	**Tut**	**Total**
L501	**Laboratory I – AWT + Dot Net**	--	**06**	--	--	**06**	--	**03**

Examination Scheme				
End Sem. Exam. [Once in a semester]				
Laboratory Name	**Term Work**	**Pract**	**Oral**	**Total**
Laboratory I – AWT + Dot Net	25	50	25	100
AWT	15	25	15	55
Dot Net	10	15	10	35
Journal/Documentation	--	10	--	10

(L501 spans the Laboratory Name rows on the left)

Semester **Semester V**

Subject Code **L501**

Name of Subject **Lab I - AWT + Dot Net**

Objectives To enable the students to understand the concepts of the advanced web technologies and enable students to learn to produce well designed, effective standalone applications using .NET technology and enable students to learn the implementation of web services. The subjects enable students to learn to produce well designed, effective Web applications.

Outcomes Students understand the concepts of the advanced web technologies. Students learn to produce well designed, effective standalone applications using .NET technology. Students learn to the implementation of web services. Students learn to produce well designed, dynamic Web applications.

Contents

Unit		No. of Hrs
Unit I	**Introduction to C#**	**8 Hrs**

- Program to demonstrate reference data types i.e. string, date time
- Program using array, using object and class , using array list, collection

Unit II   **Program based on Exception Handling ,Generic, Inheritance and polymorphism**   **9 Hrs**

- Program to demonstrate getter and setter method
- Program to On Exception Handling Mechanism covering (Try,Catch,Throw,Throws,Finally)
- Program to demonstrate generic, to demonstrate inheritance and polymorphism

Unit III   **Program based on File handling and Database programming**   **9 Hrs**

- Program to demonstrate use of directories, sequential access file , random access file
- Program on serialization and deserialization
- Program to demonstrate LINQ , based on database access using ADO.NET

Unit IV   **ASP.NET :**   **8 Hrs**

- Program based on PostBack and CrossPage posting
- Program based on validation controls
- Program using Master Pages and Themes and Skins
- Program to demonstrate PageLife Cycle
- Program to demonstrate binding of different **Controls using ADO .NET ,** Program to demonstrate the use of jQuery

Unit V   **Managing State:**   **8 Hrs**

- Program to demonstrate Managing State with ViewState and Session
- Program based on Cookies for maintaining state.
- Program using Cache Object to store Data, Program on a Shopping Cart

Unit VI   **Web services :**   **9 Hrs**

- Program to create web service
- Program to create web service which returns DataSet.
- Program to call web service asynchronously
- Program for securing a Service using Windows Authentication
- Program for securing a Service using SOAP header

Unit VII   **Advance .NET Concepts :**   **9 Hrs**

- Simple Program based on WCF , based on WPF, based on WF
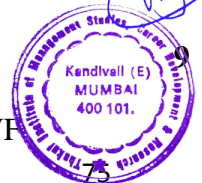
- Program to demonstrate the use of silverlight
- Program using AJAX controls

References :

1. B.M. Harwani ,"Practical ASP.NET Projects", SPD Publication
2. .NET programming Black Book, DreamTech Press
3. Jack Purdum, "Beginning C# 3.0: An Introduction to Object Oriented Programming", Wrox Publication,2008
4. Jonathan Chaffer and Karl Swedberg "Learning jQuery", 3rd Edition , SPD Publication,2012
5. ChiragPatel, "Advance .NET Technology" 2nd Edition , DreamTech Press,2012
6. CristianNagel,BillEvjen,JayGlynn,Karli Watson, Morgan Skinner, "Professional C# 2012 and .NET 4.5" , Wrox Publication
7. Anne Boehm,JoelMurach, "murach's ASP. NET 4 Web Programming with C# 2010", 4th Edition , SPD Publication,2011
8. Anne Boehm,Ged Mead, "murach's ADO. NET 4 database Programming with C# 2010", 4th Edition , SPD Publication,2011
9. Andrew Trolsen, "Pro C# 5.0 and the .NET 4.5 Framework" 6th Edition, APress,2013
10. Vijay Mukhi and SonalMukhi, "Visual Studio .NET with C#" , BPB Publication
11. Andrew Stellman and Jennifer Greene, "Head First C#", 2nd Edition , O'Reilly, SPD Publication
12. Web Technologies Black book , DreamTech Press, 2013
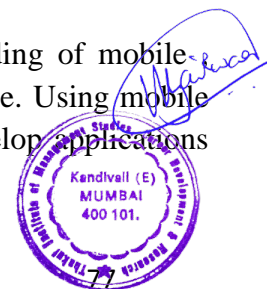13. Ralph Moseley & M. T. Savaliya, "Developing Web Application", 2nd Edition, Wiley,2012
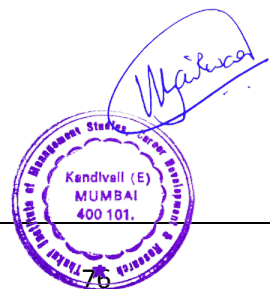
L502		Lab II- Wireless & Mobile Technology + Mini project						
Subject Code	**Subject Name**	**Teaching Scheme** **(Contact Hours per week)**			**Credits Assigned**			
		Theory	**Pract**	**Tut**	**Theory**	**Pract**	**Tut**	**Total**
L502	**Laboratory II – Wireless & Mobile Technology + Mini project**	--	**06**	--	--	**06**	--	**03**
Examination Scheme								
End Sem. Exam. [Once in a semester]								
	Laboratory Name				**Term Work**	**Pract**	**Oral**	**Total**
L502	**Laboratory II – Wireless & Mobile Technology + Mini project**				**25**	**50**	**25**	**100**
	Wireless & Mobile Technology				**15**	**25**	**15**	**55**
	Mini project				**10**	**15**	**10**	**35**
	Journal/Documentation				--	**10**	--	**10**

**Name of Subject** **WIRELESS AND MOBILE TECHNOLOGY LAB AND MINI PROJECT**

Semester **V**

Objectives This subject aims to provide a working knowledge of latest wireless and communication technology and an interactive environment in which the students can learn and practice their skills in mobile applications, mobile software development, and game design. It provide students with skills to apply design and development principles in the construction of recent mobile technologies and PhoneGap which is a mobile development ramework which enables programmers to build application for mobile devices using JavaScript, HTML5 and CSS

Outcomes Students would be able to demonstrate knowledge and understanding of mobile Application Programming Interface(API), in order to develop mobile. Using mobile development framework like PhoneGap, it enables students to develop applications irrespective of the underlying mobile operating system.

Unit No	Contents	No of. Hrs
Unit I	**Introduction To Phonegap**	**4 Hrs**
	o A Little PhoneGap History	
	o Why Use PhoneGap?	
	o How PhoneGap Works	
	o Designing for the Container	
	o Writing PhoneGap Applications	
	o Building PhoneGap Applications	
	o PhoneGap Limitations	
	o PhoneGap Plug-Ins	
	o Getting Support for PhoneGap	
	o PhoneGap Resources	
	o Hybrid Application Frameworks	
Unit II	**Phonegap Development, Testing, And Debugging**	**8 Hrs**
	o Hello, World!	
	o PhoneGap Initialization	
	o Leveraging PhoneGap APIs	
	o Enhancing the User Interface of a PhoneGap Application	
	o Testing and Debugging PhoneGap Applications	
	o Dealing with Cross-Platform Development Issues	
	o API Consistency	
Unit III	**Configuring An Android Development Environment For Phonegap**	**8 Hrs**
	o Installing the Android SDK	
	o Eclipse Development Environment Configuration	
	o Creating an Android PhoneGap Project	
	o Testing Android PhoneGap Applications	
Unit IV	**API**	**20 Hrs**
	o Accelerometer	
	▪ Querying Device Orientation	
	▪ Watching a Device's Orientation	
	o Capture	
	▪ Using the Capture API	
	▪ Configuring Capture Options	
	▪ Capture at Work	
	o Contacts	
	▪ Introduction	
	▪ Listing all available contacts	
	▪ Displaying contact information for a specific individual	
	▪ Creating and saving a new contact	
	o Events	
	▪ Creating an Event Listener	
	▪ Device ready Event	
	▪ Application Status Events	
	▪ Network Status Events	
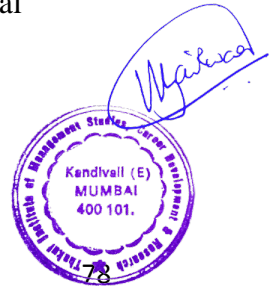
- Button Events
  - o File System, Storage, Connection and Local Databases
    - Introduction, Saving a file to device storage, Opening a local file from device storage
    - Displaying the contents of a directory
    - Creating a local SQLite database, Uploading a file to a remote server
    - Caching content using the web storage local storage API
  - o Notification
    - Visual Alerts (Alert and Confirm), Beep, Vibrate
    - Notification in Action
    -

Unit VI   Mini Project will be made with mobile technology with android as the platform or   **20 hrs**
Advanced Web Technologies like ASP.NET, C#

References :

1. PhoneGap Essentials – John M. Wargo
2. Beginning PhoneGap – RohitGhatol , Yogesh Patel
3. Hello, android   ED brunette   pragmatic bookshelf