

AC 29/4/2013 Item no. 4.88

UNIVERSITY OF MUMBAI



Revised Syllabus

Program -M.C.A.

(MASTER OF COMPUTER APPLICATION)

(SECOND AND THIRD YEAR)

(As per Credit Based Semester and Grading System With effect from 2013-2014 for Second year & from 2014-15 for third year)

**Program Structure for
Master in Computer Application (MCA)
University of Mumbai, Mumbai**

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					End Sem. Exam.	Term Work	Pract.	Oral /Project Presentation
		Internal Assessment								
		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	04	--	--	04	--	--	04	
MCA4052	Embedded Systems								
MCA4053	SOA								
MCA4054	E Business								
MCA4055	Human Computer Interface								
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				End Sem. Exam.	Term Work	Pract.	Oral
		Internal Assessment			Avg.				
		Test1	Test 2						
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	20	20	20	80	--	--	--	
MCA4052	Embedded Systems								
MCA4053	SOA								
MCA4054	E Business								
MCA4055	Human Computer Interface								
L401	Lab I- Core & Advanced JAVA	--	--	--	--	25	50	25	
L402	Lab II-ADTA + UML	--	--	--	--	25	50	25	

Total			100	400	50	100	50
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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	04	--	--	04	--	--	04	
MCA5052	Multimedia Technology								
MCA5053	Information System security and Audit								
MCA5054	Bioinformatics								
MCA5055	Software Quality Assurance								
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				End Sem. Exam.	Term Work	Pract.	Oral
		Internal Assessment			End Sem. Exam.				
		Test 1	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	20	20	20	80	--	--	--	
MCA5052	Multimedia Technology								

MCA5053	Information System security and Audit							
MCA5054	Bioinformatics							
MCA5055	Software Quality Assurance							
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
Examination Scheme						
Theory						
Subject Code	Subject Name	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

MCA

Semester III

Syllabus

MCA301		Database Management System							
Subject Code	Subject Name	Teaching Scheme (Contact Hours per week)			Credits Assigned				
		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 Measure, Grant and revoke. Permissions Access Control-Discretionary, Manadatory, Bell La Pedula Model, Audit Trail, Challenges in database security	4 Hrs
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

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 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.

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

MCA303		Network security							
Subject Code	Subject Name	Teaching Scheme (Contact Hours per week)			Credits Assigned				
		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. [Once in a semester]						
Test 1	Test 2	Average							
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 attacks Digital Certificate- creation, verification, revocation, cross-certification KDC-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 numbers delegation, 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-Hellmann 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. [Once in a semester]					
Test 1	Test 2	Average						
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 onDegeneracy, 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)	4 Hrs.
Unit VII	Travelling salesman problem :Branch & Bound technique, Hungarian method	2 Hrs.
Unit VIII	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 Instructions for Students’ Assignments: Each candidate will submit a journal which will have case studies on Decision Theory, PERT-CPM and Replacement theory.	2 Hrs.

References:

1. Hillier F., and Lieberman, G.J. “Introduction to Operation Research”, Holden Day
2. Operations Research Applications and Algorithms Wayne 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. [Once in a semester]					
Test 1	Test 2	Average						
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, CostEstimating: 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 **4 Hrs.**
Developing the Project Team, Managing the Project Team, Change management : Dealing with Conflict & Resistance Leadership & Ethics
- Unit IX The Project Implementation Plan and Closure : Project 6 Hrs.**
ImplementationAdministrative Closure, Project Evaluation
Leadership & Ethics in Projects: Project Leadership, Ethics in Projects, Multicultural Projects

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.

Unit VI	a Constraint, Enabling & Disabling PL/SQL Practical 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	4 Hrs.
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 Trigger: Trigger, Statement Trigger, Row Trigger, Using Conditional Operations, DML Operations	4 Hrs.
Unit IX	Exceptions: Block Structure, Exception Handlers, Types of Exceptions Records: Table-Based, Cursor-Based, Programmer-Defined	4 Hrs.
Unit X	Functions: Create Function, Function with Arguments, Executing Function, Dropping Function 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	4 Hrs.

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 References 1. Testing in 30 + open source tools by shende SPD 2. Software testing foundations 2edandreasspillner SPD	2 Hrs.

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, Servlet API overview, Servlet Life cycle, Generic servlet, HTTPServlet, ServletConfig, ServletContext, 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 vs Struts 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
Clustering-HierarchicalAlgorithm(Agglomerative Igorithm),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

14Hrs

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 ,
Object oriented versus Object relational
Database design for ORDBMS
New Challenges in implementing ORDBMS: Storage & access methods, Query processing and Optimization

6Hrs

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 documents and databases, XML Querying
Time-in databases, Spatial & Geographic data , multimedia databases

5Hrs

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 simulating the 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 simulation with examples (Experimentation, experience, ethics, human interaction)	4Hrs

Unit II	Description and Solution of Simulation Examples: Simulation Examples based on statistical distributions: Discretedistributions,Continuousdistributions,Poissonprocess,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.	10Hrs
Unit III	Simulation Model using Random Numbers and Random variates: Random-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.	10Hrs
Unit IV	Input Analysis: Input Models with Data: Data Collection, Identifying the 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	10Hrs
Unit V	Verification & Validation and Optimization of Simulation Models: Model 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.	6Hrs
Unit VI	Modeling and Simulation of Real World Problem: Simulation of manufacturing systems,Simulationofcomputersystems,Simulationofsupermarket,Simulationofperptnetwork. Simulation of Transportation model, business model, Medical models, Social Science models.	5Hrs

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
Employability Skills		
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	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.	6 Hrs

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	<p>This course is designed to introduce students to geographic information systems (GIS). The purpose of the course is as follows</p> <ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 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

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	<ol style="list-style-type: none"> 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 <ul style="list-style-type: none"> • 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

	<p>EPROM, EEPROM, OTP ROM, Flash memory, RAM : SRAM,DRAM, SDRAM,RDRAM, Address allocation in memory.</p> <ul style="list-style-type: none"> • Peripheral Devices: Different I/O types, serial devices, parallel port devices, timers and counters, watchdog timer 	
Unit III	<p>Communication interface standards:</p> <p>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</p>	8 Hrs
Unit IV	<p>Embedded/Real time operating systems:</p> <p>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.</p>	12 Hrs
Unit V	<p>Testing, Debugging and simulation techniques</p> <p>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</p>	5 Hrs
Unit VI	<p>Overview of Embedded/ Real- time operating systems:</p> <p>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</p>	5 Hrs

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, WileyDreamtech 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

	<p>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</p> <p>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</p>	
Unit IV	<p>Common Semantics:Documents - Defining Documents, Adapting the Information Model, Multiple Documents</p> <p>Documents and XML - XML Schema, Types in Schemas, Document Variations in Schemas, Designing for Change</p>	3 Hrs
Unit V	<p>XML Patterns - Derivation Using Abstract Classes, Derivation by Extension , Derivation by Restriction</p> <p>Service Oriented Enterprise Application : Consideration for service oriented Enterprise Applications- Service Enablement, Service Integration, Service Orchestration, Service Infrastructure</p> <p>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.</p>	10 Hrs
Unit VI	<p>Service Oriented Analysis and Design: Need for models, Principles of service Design –Reuse, Integration, Agility</p> <p>Design of Activity Services (or Business Services) -Illustration</p> <p>Design of Data Services, Design of Client Services, Design of Business Process Services, Illustration – Loan Approval Business Process, Explanation of Loan Approval Process</p>	5 Hrs
Unit VII	<p>SOA Governance, Security and Implementation: SOA Governance- Strategic Architecture (Process, Technologies, People)</p> <p>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</p>	6 Hrs

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

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	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 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

Unit II	Defining E-business idea: The Entrepreneurial process, The entrepreneur The entrepreneurial process, Factors affecting E-business 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	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	8 Hrs
	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	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 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 <ol style="list-style-type: none"> 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 <ol style="list-style-type: none"> 1. Program to perform different operations on Array and String 2. Program using Interface and Inheritances covering domain like 	4 Hrs

	educational institute, banking etc.	
Unit III	Program on packages and exception Handling	4 Hrs
	<ol style="list-style-type: none"> 1. Program using Wrapper class to cover auto boxing and un boxing 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
	<ol style="list-style-type: none"> 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
	<ol style="list-style-type: none"> 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
	<ol style="list-style-type: none"> 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
	<ol style="list-style-type: none"> 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
	<ol style="list-style-type: none"> 1. Program on session, message and entity bean 	
Unit X	Introduction to Framework :Struts	12 Hrs
	<ol style="list-style-type: none"> 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, Dreamtech 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	4 Hrs
Unit VI	Implementation of Bitmap Indexes and Join Indexes. Implementation of different Data mining algorithms: Association, Classification, Clustering using WEKA/ XLMiner	4 Hrs
Unit VII	Implementation of, <ul style="list-style-type: none"> • Abstract Data Type 	4 Hrs

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

Unit VIII

Working with multimedia database using a front programming language eg:
JAVA.

4 Hrs

UML LAB

Name of the Subject	UML LAB
Semester	IV
Objective	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 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 <ul style="list-style-type: none"> • 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)