

UNIVERSITY OF MUMBAI
No.UG/ 251 of 2008.

CIRCULAR :-

A reference is invited to the Ordinances, Regulations and syllabi relating to the Master of Computer Applications (M.C.A.) degree course vide Pamphlet No.194 and to this office Circular No.UG/96 of 2004 dated 8th March, 2004 and the Directors/Heads of the recognized Institutions concerned and the Professor-cum-Directors, Institute of Distance Education are hereby informed that the recommendation made by the Ad-hoc Board of Studies in Master of Computer Applications at its meeting held on 1st April, 2008 has been accepted by the Academic Council at its meeting held on 15th April, 2008 vide item No.4.25 and that, in accordance therewith, the syllabus of Master of Computer Applications (Sem. III and Sem. IV) degree course is revised as per Appendix and that the same has been brought into force with effect from the academic year 2008-2009.

Mumbai 400 032
16th June, 2008.

for REGISTRAR.

To,

The Directors/Heads of the recognized Institutions concerned and the Professor-cum-Directors, Institute of Distance Education.

A.C/4.25 /15.04.2008

No.UG/ 251-A of 2008, MUMBAI-400 032 16th June, 2008.

Copy forwarded with compliments for information to :-

- 1) The Dean, Faculty of Technology.
- 2) The Chairperson, Ad-hoc Board of Studies in Master of Computer Applications.
- 3) The Controller of Examinations.
- 4) The Co-ordinator, University Computerization Center.

for REGISTRAR

Copy to :-

The Director, Board of College and University Development, , the Deputy Registrar (Eligibility and Migration Section), the Director of Students Welfare, the Executive Secretary to the Vice-Chancellor, the Personal Assistant to the Pro-Vice-Chancellor, the Registrar and the Assistant Registrar, Administrative sub-center, Ratnagiri for information.

The Controller of Examinations (10 copies), the Finance and Accounts Officer (2 copies), Record Section (5 copies), Publications Section (5 copies), the Deputy Registrar, Enrolment, Eligibility

UNIVERSITY OF MUMBAI



Revised Syllabus

of

(Semester III & IV)

M.C.A. Degree Course

(With effect from the academic year 2008-2009)

**Master of Computer Application
Second Year Semester-III**

Sr.No.	Code	Subject	No. of Periods per Week (60 min each)			Duration Of Theory Paper	Marks				
			Lectures	Practicals	Tutorials		Theory paper	Term Work	Practical	Oral	Total
1	3.1	Objected Oriented Programming C++	4	3	-	3	100	25	25	25	175
2	3.2	Data Base Management Systems	4	3	-	3	100	25	25	25	175
3	3.3	Data Communication Networks	4	3	-	3	100	25	25	25	175
4	3.4	Operation Research	4	-	1	3	100	25	-	-	125
5	3.5	Software Engineering	4	-	1	3	100	25	-	-	125
6	3.6	Management Information System	4	-	1	3	100	25	-	-	125
Total			24	9	3	18	600	150	75	75	900

Second Year Semester-IV

Sr.No.	Code	Subject	No. of Periods per Week (60 min each)			Duration Of Theory Paper	Marks				
			Lectures	Practicals	Tutorials		Theory paper	Term Work	Practical	Oral	Total
1	4.1	Java Programming	4	3	-	3	100	25	25	25	175
2	4.2	Object Oriented Modeling and Design Using UML	4	3	-	3	100	25	25	25	175
3	4.3	Network Security	4	-	1	3	100	25	-	-	125
4	4.4	Advance Database Techniques	4	3	-	3	100	25	25	25	175
5	4.5	Software Project Management	4	-	1	3	100	25	-	-	125
6	4.6	Elective I	4	-	1	3	100	25	-	-	125
Total			20	9	2	-	500	125	75	75	775

Out of the following elective subject student will choose one subject as Elective I (Sem IV)

1	E. Business
2	Embedded Systems
3	Geographic Information System
4	Customer Relationship Management
5	Artificial Intelligence

Syllabus of Master of Computer Application

Semester - III

Object Oriented Programming C++		
Lectures: 4 Hrs/week One paper: 100 marks / 3 Hrs duration Term Work : 25 marks		
Practical: 3 Hrs /week Practical exam: 50 marks		
1	Introduction What is object-oriented programming? Why Do We Need Object-Oriented Programming characteristics of Object-Oriented Languages. C++ And C	4 Hrs
2	C++ Programming Basics: Output Using cout. Directives. Input With cin. Type bool. The setw Manipulator. Type Conversions.	4 Hrs
3	Functions: Returning values From Functions. Reference Arguments. Overloaded Function, Inline Function. Default Arguments. Returning By Reference.	4 Hrs
4	Object And Classes: Making sense of core object concepts (Encapsulation Abstraction, Polymorphism, Classes, Messages Association, Interfaces) Implementation of Class in C++, C++ Objects As Physical Object, C++ Object As Data Types Constructor. Object As Function Arguments. The Default Copy Constructor, Returning Object From Function. Structures And Classes. Classes Objects And Memory Static Class Data. Const Data. Const And Classes.	6 Hrs
5	Arrays and String Arrays Fundamentals. Arrays as Class Member Data. Arrays Of Object. String. The Standard C++ String Class.	3Hrs
6	Operator Overloading: Overloading Unary Operators. Overloading. Binary Operators. Data Conversion. Pitfalls of Operators Overloading And Conversion. Keywords Explicit And Mutable	4 Hrs
7	Inheritance: Concept of Inheritance, Derived Class And Base Class, Derived Class Constructors, Overriding Member Function, Inheritance In The English Distance Class. Class Hierarchies, Inheritance And Graphics Shapes, Public And Private Inheritance, Levels Of Inheritance, Multiple Inheritance, Ambiguity In Multiply Inheritance, Aggregation: Classes Within Classes, Inheritance And program Development.	4 Hrs
8	Pointer. Addresses And pointer, The Address-Of Operator.&, Pointer And Arrays, Pointer And Function. Pointer And C- Types String, Memory Management: New And Delete. Pointers To Objects, Debugging pointers.	4Hrs

9	Virtual Function Virtual Function, Friend Function, Static Function, Assignment And Copy Initialization, This Pointer, Dynamic Type Information.	4Hrs
10	Streams and Files. Streams Classes. Stream Errors. Disk File I/O with Streams, File Pointers, ErrorHandling In File I/O File I/O With Member Function, Overloading the Extraction And Insertion Operators Memory As A Stream Object, Command line Arguments, and Printer Out put.	2 Hrs
11	Templates And Exceptions Function Templates, Class Templates Exceptions.	2Hrs
12	The Standard Template Library Introduction Algorithms, Sequence Containers, Iterators, Specialized Iterators, Associative Containers, Storing User- Defined Object, Function Objects.	4Hrs
Term work/Assignment: Each candidate will submit a journal in which at least 10 assignments based on the above syllabus and the internal test paper. Test will be graded for 10 marks and assignments will be graded for 15 marks.		
<u>References :-</u> 1. Object Oriented Programming in-C++ By Robert Lafore Techmedia Publication 2. The Complete Reference c- - By Herbert Sehlidt Tata Megraw-hill publication 3. Object Oriented Programming in C++ Saurav Sahay Oxford University Press 4. Object Oriented Programming and C++ R. Rajaram New Age International Publishers 2nd 5. OOPS C++ Big C++ Cay Horstmann Wiley Publication <u>Practical For C++</u> Programming exercises and Project using C++ programming languages, to study various features of the languages. Stress to be laid on writing well structured modular and readable programs accompanied by good documentation. The topic wise assignments are as follows: 1. Function Blocks - Handling default Reference Arguments - Handling Inline and Overloaded Function. 2. Objects and Classes - Creating UDT using classes and object. 3. Arrays and String as objects - Insertion, Deletion, reversal Sorting of elements into a single		

Database Management Systems

Lectures: 4 Hrs/week

Practical: 3 Hrs /week

One paper: 100 marks / 3 Hrs duration

Practical exam: 50 marks

Term Work : 25 marks

1. **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, Network models 4 Hrs
2. **Entity Relation Model:** Entity, attributes, keys, relation. Cardinality, participation. Weak entities, ER Diagram Generalization Specialization and aggregation. Conceptual design with ER Model. Entity versus Attribute Entity versus Relationship Binary Versus Ternary relationship. Aggregate versus Ternary relationship. 4 Hrs
3. **Relational Model:** Introduction to relational model, Creating and modifying relations using SQL, Integrity Constraints over relation. Logical database design: ER to relational, Relational Algebra 6 Hrs
4. **SQL:** Data definition commands. Constraints, Views, Data manipulation Commands, Queries SELECT- FROM-WHERE, Aggregate Queries, NULL values. Outer JOINS, Nested Queries- Correlated queries. Embedded SQL. Dynamic SQL Triggers.. 6 Hrs
5. **One Database application development** 3 Hrs
6. **Overview of Storage and Indexing:** Storage Hierarchies, Tree structured indexing and Hash Based Indexing 4 Hrs
7. **Query Evaluation Overview:** Overview of Query optimization- Query evaluation plan, Relational Optimization – Cost of a plan estimating result Sizes. 3 Hrs
8. **Schema refinement and Normal Forms:** Functional Dependencies, First, Second Third, Fourth and Fifth Normal form, BCNF ,Comparison of 3 NF and BCNF Lossless and dependency preserving decomposition, Closure of dependencies, Minimal Closure 6 Hrs
9. **Transaction processing:** Transaction Concurrency control recovery of Transaction failure, Serilazibility, Log based recovery, locking techniques. Granularity in locks. Time stamping techniques, Two phase locking system, Deadlock Handling 7 Hrs
10. **Security and Authorization.** Grant and revoke. Permissions Access Control 2 Hrs

Term Work :- Term work/Assignment :- Each candidate will submit a journal in which at least 10 assignments based on the above syllabus and the internal test paper. Test will be graded for 10 marks and assignments will be graded for 15 marks.

References

1. "Database Managements Systems," Raghu Ramakrishnan, Johannes Gehrke Third Edition, McGraw Hill
2. Database Manegament Pratt & Adamski Thomson 7th Edition
3. "Database Systems Concepts" Korth Silerchatz, McGraw Hill.
4. "Fundamental of DBMS" Mark Gillenson Wiley Publication
5. "Fundamental of Database System". Elmasari and Navathe, Benjamin Cummins.
6. "Database Systems design, implementation and managements", Rob Coronel. Course Technologies.
7. "Introduction to Database Management Systems" C. J. Date
8. Modern Database Management Jaffrey A. Hoffer ., Mary B. Prescott, and Fred R McFadden Pearson 7th

Practicals

1. SQL commands for DDL, Creation of simple dada tables with insertion of data
Create table, Create index Pkey creation.
2. SQL command for manipulation of data using
select...from...where...sequences with variation.
3. Write embedded code for getting the data from table-embedding using
 - i. Pro*C/Pro*Cobol/PL/SQL- basic idea is to be able to work with coerces and record accessing
4. Design and analysis of an application like: Travel agency. Online Placement service. Hostel accounting systems. Library management system, Bank front office management etc.
5. Creating of the database.
6. Five queries for the database created.
7. Five input screen for data output

Data Communications And Networking Lectures: 4 Hrs/week One paper: 100 marks / 3 Hrs duration Term Work : 25 marks Practical: 3 Hrs /week Practical exam: 50 marks		
1	Fundamental in communication Concepts of data transmission Signal encoding Synchronization Coding methods Multiplexing -FDM -TDM -WDM Modulation methods -Amplitude -Frequency -Phase Frequency, phase and digital modulation such as PAM, PWM, PCM. Modes of communication Simplex Half Duplex Full Duplex. Switching techniques Circuit switching Message switching Packet switching.	(6hrs)
2	Introductions Uses of computer network, LANs, MANs, WANs, Wireless Networks, Internetwork The OSI Reference Model The TCP/IP Reference model A comparison of the OSI and TCP Reference Models	($\frac{1}{2}$ hrs)
3	The Physical layer Transmission Media- Magnetic media Twisted Pair Coaxial Cable Fiber optics Wireless Transmissions The electromagnetic Spectrum Radio Transmission Microwave Transmission Infrared and millimeter Waves Light wave Transmission.	(3 hrs)

4	The Data link layer Data Link Layer Design Issues Error detection and correction Elementary Data Link Protocols Sliding Window Protocols Example – HDLC	(7 hrs)
5	The Medium Access Sub layer. Multiple Access Protocols ALOHA (Pure, slotted, Reservation) Carrier Sense Multiple Access Protocols Collision free Protocols. IEEE Standard 802.3, 802.4, 802.5, 802.6 High speed LANs – FDDI Satellite Networks – Polling, ALOHA, FDMA, TDMA, CDMA, categories of satellites – GEO, MEO, LEO	(6 hrs)
6	The Network Layer Network Layer Design Issues Routing Algorithms The Optimality Principal Shortest Path Routing Flooding Distance Vector Routing Link state Routing Broadcast Routing Multicast Routing. Internetworking The Network layer in the Internet – Address mapping (ARP, RARP, BOOTP, DHCP), IP Addresses, Subnets, IP Protocols –Ipv4, IPv6, ICMP, IGMP	(7 hrs)
7	The Transport Layer The Transport Protocols The Internet Transport Protocols – The TCP Services Model, The TCP protocol and The TCP Segment Header, UDP Congestion control and quality of service	(6 hrs)
8	The Application layer WWW, HTTP, DNS, SNMP, FTP, Remote logging, E-mail, Cryptography, symmetric key and asymmetric key cryptography, DES, RSA algorithms, security services – message and entity	(6 hrs)
	Term Work :- Term work/Assignment :- Each candidate will submit a journal in which at least 10 assignments based on the above syllabus and the internal test paper. Test will be graded for 10 marks and assignments will be graded for 15 marks.	

References:

1. Tanenebaum A. S- Computer Network (3rd ed) –
2. Stalling William – Data Computer Communications
3. Computer communications & Networking Technologies Michael A. Gallo and William M. Hancock Thomson
4. Data Communication and Computer Networks ISRD Group The Tata McGraw-Hill Companies
5. Behrouz Forouzan – Data Communications and networking TMH publication
6. Douglas Comer – Data Communication
7. Jerry FitzGerald, Alan Dennis - Business data communications and networking (8th edition) Wiley publication
8. Black U – computer Network – Protocols, Standards and Interfaces.
9. Youlu Zheng, Shakil Akhtar – Networks for Computer Scientists and Engineers

DCN Practical List

1. Write a program to implement VRC and LRC method.
2. Write a program to implement CRC where user will accept the data and the CRC polynomial.
3. Write a program to implement checksum method.
4. Write a program to check and correct the error in the data at receiver end by implementing hamming code.
5. Write a program to generate chipping sequence using Walsh matrix method.
6. Write a program to implement character level encryption by monoalphabetic encryption method.
7. Write a program to implement character level encryption by polyalphabetic encryption method.
8. Write a program to implement stop and wait ARQ.
9. Write a program for shortest path routing algorithm (Dijkstra's algorithm).
10. Write a program to generate sink tree for given network.
11. Write a program to implement DES algorithm using C.
12. Write a program to implement sliding window protocol using C.
13. Write a program to implement (Go back n) allows multiple outstanding frames using C.
14. Write a program to implement client server application using C.
15. Write a program to implement Distance Vector Routing algorithm using C.
16. Write a program to demonstrate setting up a simple dumbbell network by setting up TCP connection using NS2.
17. Write a program to implement network topology for 4 to 6 nodes using UDP connection using NS2 simulator.
18. Write a program to implement Unicast or Multicast routing between the source node and destination node.
19. Write a script in NS2 to implement Diffserv.

Operations Research		
Lectures: 4 Hrs/week		Tutorial :- 1 Hr / week
One paper: 100 marks / 3 Hrs duration		Term Work : 25 marks
1	Nature of Operation Research - History - Nature of OR - Impact of OR - Application Areas	1 hr
2	Overview of Modeling Approach - Formulating the problem - Construction a Mathematical Model - Deriving a solution - Testing the Model and the Solution - Establishing Control over the solution - Implementation issues	1 hrs
3	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 - Degeneracy - alternative optima - unbounded solutions - Infeasible solutions.	10 hrs
4	Dual problem - Relation between primal and dual problems - Dual simplex method	3 hrs
5	Transportation Problem - Starting solutions. North West corner Rule - lowest cost method–Vogels approximation method - MODI Method	4 hrs

6	Assignment problem 1. Hungarian Method.	2 hrs
7	Travelling Salesman Problem 1. Branch & Bound Technique 2. Hungarian Method	3 hrs
8	Sequencing Problem 1. 2 machines n jobs 2. 3 machines n jobs 3. n machines m job	2hrs
9	Pert and CPM 1. arrow network 2. time estimates ,earliest expected time, latest allowable occurrence time, latest allowable occurrence time and slack 3. critical path 4. probability of meeting scheduled date of completion of project 5. calculation of CPM network 6. various floats for activities 7. Project Crashing	5 hrs
10	Integer Programming 1. Branch and Bound Algorithm 2. Cutting plane algorithm.	3 hrs
11	Deterministic Inventory Models 1. Static EOQ Models 2. Dynamic EOQ models.	5hrs
12	Game theory 1. Two person Zero Sum Games 2. Solving simple games.	3hrs
13	Replacement theory 1. Replacement of items that deteriorate 2. Replacement of items that fail group replacement and individual replacement.	3hrs
Term Work :- Term work/Assignment :- Each candidate will submit a journal in which at least 10 assignments based on the above syllabus and the internal test paper. Test will be graded for 10 marks and assignments will be graded for 15 marks.		

References:

1. Gillet, B.E., "Introduction to Operation Research : a computer oriented algorithmic approach " Tata McGraw Hill, NY.
2. Hillier F., and Lieberman, G. J. , "Introduction to Operation Research", Holden Day , NY.
3. Operations Research Applications and Algorithms Wayne L. Winston Thomson
4. Optimization Methods K.V.Mital & Mohan New Age
5. Operations Research Operation Research: Principles and Practice 2nd edition Ravindran wiley Publication
6. Kambo, N.S., "Mathematical Programming Techniques", McGraw Hill.
7. Kanti Swaroop, 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

Software Engineering Lectures: 4 Hrs/week One paper: 100 marks / 3 Hrs duration			Tutorial :- 1 Hr / week Term Work : 25 marks
1	<u>Introduction :</u> a. Software Crisis & Software Scope b. What is Software Engineering c. Terminologies in Software Engineering d. Role of Management in Software Development		4 hrs
2	<u>Software Planning</u> a. projects planning- problem, Process b. Project Size Estimation Metric: Measures, Metrics and Indicators, Line of Code (LOC) Function Pair metric, Features Point metric c. Decomposition Techniques d. Software Estimation: Empirical Estimation Techniques – COCOMO II Model, Heuristic Techniques. e. Analytical Estimation Techniques: Expert Judgment make- Bye Decision f. The Putman Resource Allocation Model		4 hrs
3	<u>Project Scheduling and Tracking</u> a. Relationship between people and Effort: Staffing Levci Estimation, Effect of schedule Change on Cost b. Selecting Software Engineering Tasks: Degree of Rigor, Task set selector, Task Network c. Schedules: Work breakdown Structure. Task Network/Activity Networks, Gantt Charts, PERT Charts d. Organizations and Team Structures: Organization Structures. Team Structures		6 hrs
4	<u>Software Risk Management:</u> a. Reactive & proactive risk Strategies b. Risk Identification, c. Risk Assessment. and Risk Projection. Risk Containment, d. Risk Mitigation. Monitoring and Management e. RMM Plan		6 hrs
5	<u>Software Configuration Management:</u> a. Necessity of Software Configuration Management Baseline SCM Process and SCI, b. Configuration Audit Version Control Source Code Control Systems (SCCS) c. Change Control, Configuration Audit , Status Reporting		4 hrs
6	<u>Overview of Requirements Analysis and Specification</u> a. Requirements Analysis b. Software Requirements Specification (SRS): SRS Documents, Characteristics of		3 hrs

	a Good SRS Documents, Organization of the SRS Documents, Techniques for Representing Complex Logic Formal Systems Development Techniques	
7	<u>Software Design</u> - What is Good Software Design? - Cohesion and Coupling: Classification of Cohesiveness, Classification of Coupling - Software Design Approaches: Function-Oriented Design, Object-Oriented Design	3 hrs
8	<u>Function-Oriented Software Design</u> - Overview of the SSAD Methodology - Structure Analysis - Data Flow Diagrams (DFDs) - Extending the DFD Techniques to Real Time Systems - structures design	3 hrs
9	<u>Software Testing</u> - Testing Overview: Verification vs Validation, Design of test cases - Black-Box testing: Equivalence Class Partitioning, Graph based testing Boundary Value analysis - White-Box Testing: Statement Coverage, Branch Coverage, Condition Coverage, Path Coverage, Cyclomatic Complexity Metric Data Flow-Based Testing - Testing specialized Environments: Testing GUI, Testing Client / Server Architectures - Integration Testing: Top down Testing, Bottom Up testing, Regression Testing, phased vs Incremental Integration testing - Systems Testing: Stress Testing Recovery Testing Security Testing. - Debugging Techniques, Approaches, Tools	6 hrs
10	<u>Software Quality Concepts</u> - Software Quality Management Systems - Software Quality Assurance - Software reviews - Formal Technical Reviews - Overview of ISO 9001 , SEI Capability Maturity Model, Mc Calls Quality Model	5 hrs
11	<u>Software Reliability</u> - Software Reliability - Reliability Metrics - Reliability Growth Modeling	1 hrs
12	<u>Software Maintenance</u> - Software Reverses Engineering - Software Maintenance Costs - Estimation of Maintenance Costs	2 hrs

Term Work :- Term work/Assignment :- Each candidate will submit a journal in which at least 10 assignments based on the above syllabus and the internal test paper. Test will be graded for 10 marks and assignments will be graded for 15 marks.

References :

1. Software Engineering By Roger Pressman Tata McGraw hill
2. Software Engineering James Peters Wiley Publication
3. Software Engineering by Rajib Mall
4. Software Engineering by K.K. Agarwal , Yogesh Singh New Age Publication
5. Software Metrics By Norman E.Fenton & Shari Lawrence Pfleeger, Thompson
6. Software Testing Technique By Scott Loveland, SPD

Assignments

There are no practical for this subject in the syllabus. However, group project are done by assigning project to the group. The project is from following topics: Travel agency Online placement services Hostel accounting systems Library management systems, Bank front office management etc. The following document are product for the project:

- Project proposal
- Systems requirement study and analysis
- Project analysis and design
- Project estimation plan
- Risk mitigation monitoring and management plan the project.
- Project schedule and timeline charts
- Project code
- Project test plans

Management Information Systems

Lectures: 4 Hrs/week

Tutorial :- 1 Hr / week

One paper: 100 marks / 3 Hrs duration

Term Work : 25 marks

- 1 **Managing the Digital Firm** 2 hrs
 - Why Information System?
 - Perspectives on Information System
 - Contemporary approach to Information System
 - Learning to Use Information Systems : New Opportunities with Technology
- 2 **Information System in the Enterprise** 3 hrs
 - Major Types of System in Organisation
 - Systems from Functional Perspectives
 - Integrating Functions and Business Processes : Introduction to Enterprise Application
- 3 **Information Systems, Organisations, Management and Strategy** 4 hrs
 - 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 **Decision making** 5 hrs
 - Decision Making Concepts
 - Decision Methods, Tools and Procedures
 - Behavioral concepts in Decision Making
 - Organizational Decision Making
 - MIS and Decision Making Concepts
- 5 **Information** 5 hrs
 - Information Concepts
 - Information : A quality Product
 - Classification of Information
 - Methods of Data and Information Collection
 - Value of Information
 - General Model of a Human as a Information Processor
 - Summary of Information Concepts and their implications
 - Organisation and Information
 - MIS and Information Concepts
- 6 **Development of MIS** 6 hrs
 - 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

Organisation for development of MIS
MIS : the Factors for Success and Failure

- | | | |
|---|---|-------|
| 7 | Choice of Information Technology
Introduction : Nature of IT Decision
Strategic Decision
Configuration Decision
Evaluation
Information Technology Implementation Plan
Choice of the Information Technology and the Management Information System | 5 hrs |
| 8 | Enterprise Applications and Business Process Integration
Enterprise Systems
Supply chain Management Systems
Customer Relationship Management Systems
Enterprise Integration Trends | 4 hrs |
| 9 | Decision Support System
DSS : Concepts and Philosophy
DSS : Deterministic Systems
AI Systems
Knowledge Based Expert System
MIS and Role of DSS | 4 hrs |

Term Work :- Term work/Assignment :- Each candidate will submit a journal in which at least 10 assignments based on the above syllabus and the internal test paper. Test will be graded for 10 marks and assignments will be graded for 15 marks.

Reference Books

1. Management Information System, Oz Thomson Learning 5th Edition
2. Management Information Systems, W. S. Jawadekar, 3rd Edition, TMH.
3. Management Information System, James O'Brien, 7th edition, TMH.
4. Information Systems the Foundation of E-Business, Steven Alter, 4th Edition, Pearson Education.
5. Information Technology for Management, Turban, McLean, Wetherbe, 4th edition, Wiley
6. Management Information Systems, Loudon and Loudon, 10th Edition, Pearson Educations.
7. Management Information Systems, Jaiswal Oxford Press

Case based approach can be adopted to explain various concepts during tutorials (Internal Evaluation)

Assignments

USE of IS in different domains as Hospitality, Retail, Supply Chain, Vendor management, Inventory, etc..

At least 5 website's critical analysis in any of the domain as a market survey for designing the website for the particular business.

*Research Paper on any topic of their interest of this paper.

*Optional

Syllabus of Master of Computer Application

Semester - IV

Java Programming		
Lectures: 4 Hrs/week		
Practical: 3 Hrs /week		
One paper: 100 marks / 3 Hrs duration		
Practical exam: 50 marks		
Term Work : 25 marks		
1	Java Fundamentals Features of java, OOPs Concepts Difference between java and c++ Java Virtual Machine Reflection Byte Codes Byte Code Interpretation Data Types, variables, arrays, Expressions, Operators, and Control Structures Objects and Classes	4 hr
2	Java Classes Abstract classes Static methods Inner classes Packages Wrapper classes Interfaces This Super Access control	6 hr
3	Exception handling Exception as objects Exception hierarchy Try catch finally Throw, throws	3 hr
4	IO package Input streams Output streams Object serialization Deserialization Sample programs on io files Filter And Pipe Streams	4 hr
5	Multi Threading Thread life cycle Multi threading advantages and issues Simple thread program Thread synchronization	3 hr

6	GUI Introduction to AWT programming Layout and Component Managers Event handling Applet class Applet life cycle Passing parameters embedding in HTML Swing components-JApplet, JButton, JFrame etc. Sample Swing programs	10 hr
7	Database Connectivity JDBC Architecture Establishing Connectivity and working with connection interface Working with Statements Creating and executing SQL statements Working with Resultset	10 hr
Term Work :- Term work/Assignment :- Each candidate will submit a journal in which at least 10 assignments based on the above syllabus and the internal test paper. Test will be graded for 10 marks and assignments will be graded for 15 marks. References: 1. Programming with Java A Primer .E. Balagurusamy The Tata McGraw-Hill Companies 2. Java Programming John P. Flynt Thomson.2nd 3. Java Programming Language Ken Arnold Perason 4. The Complete Reference JAVA2. Herbert schildt, TMH 5. Big Java, Cay Horstamnn 2nd edition, Wiley India Edition 6. Core Java, Dietel and Dietel 7. Java – Balaguruswamy 8. Java Server Programming .Ivan Bayross SPD		
JAVA PROGRAMMING LAB 1. Programs using Constructor and Destructor 2. Creation of classes and use of different types of functions. 3. Count the number of objects created for a class using static member function. 4. Write programs on interfaces 5. Write programs on packages 6. Write programs using function overloading 7. Programs using inheritance. 8. Program using IO streams 9. Program using files 10. Write a program using exception handling mechanism. 11. Programs using AWT. 12. programs on swing 13. Programs using JDBC.		

Object Oriented Modeling and Design using UML

Lectures: 4 Hrs/week

Practical: 3 Hrs /week

One paper: 100 marks / 3 Hrs duration

Practical exam: 50 marks

Term Work : 25 marks

INTRODUCTION

- An overview - Object basics – Object state and properties, Behavior, Methods, Messages,
- Object Oriented system development life cycle
- Benefits of OO Methodology

3 hrs

1. Overview of Prominent OO Methodologies

- a. The Rumbaugh OMT
- b. The Booch methodology
- c. Jacobson's OOSE methodologies,
- d. Unified Process-
- e. Introduction to UML
- f. Important views & diagram to be modelled for system by UML

3 hrs

2. Functional view(models)

- Use case diagram
 - a. Requirement Capture with Use case,
 - b. Building blocks of Use Case diagram – actors, use case guidelines for use case models,
 - c. Relationships between use cases – extend, include, generalize
- Activity diagram –
 - a. Elements of Activity Diagram – Action state, Activity state, Object node, Control and Object flow, Transition (Fork, Merge, Join)
 - b. Guidelines for Creating Activity Diagrams
 - c. Activity Diagram - Action Decomposition (Rake)
 - d. Partition – Swim Lane

4 hrs

3. Static structural view (Models)

- a. Classes, values and attributes, operations and methods, responsibilities for classes, abstract classes, access specification(visibility of attributes and operations)
- b. Relationships among classes: Associations, Dependencies, , Inheritance - Generalizations, Aggregation
- c. Adornments on Association: association names, association classes, qualified association, n-ary associations, ternary and reflexive association
- d. Dependency relationships among classes, notations
- e. Notes in class diagram, Extension mechanisms, Metadata, Refinements, Derived , data, constraint, stereotypes, Package & interface notation.
- f. Object diagram notations and modeling, relations among objects (links)

5 hrs

4. Class Modeling and Design Approaches

- a. Three approaches for identifying classes – using Noun phrases, Abstraction, Use Case Diagram,
- b. Comparison of approaches
- c. Using combination of approaches
- d. Flexibility guidelines for class diagram: Cohesion, Coupling, Forms of coupling (identity, representational, subclass, inheritance), class Generalization, class specialization versus aggregation.

4 hrs

5. Behavioral (Dynamic structural view):

• **State diagram**

- a. State Diagram Notations, events (signal events, change events, Time events)
- b. State Diagram states (composite states, parallel states, History states), transition and condition, state diagram behavior(activity effect, do-activity, entry and exit activity), completion transition, sending signals.

• **Interaction diagrams:**

- a. **Sequence diagram-** Sequence diagram notations and examples, iterations, conditional messaging, branching, object creation and destruction, time constraints, origin of links, Activations in sequence diagram.
- b. **Collaboration diagram** - Collaboration diagram notations and examples, iterations, conditional messaging, branching, object creation and destruction, time constraints, origin of links, activations in sequence diagram.

6 hrs

3 hrs

6. Approaches for developing dynamic systems:

- a. Top – down approach for dynamic systems
- b. Bottom – up approach for dynamic systems
- c. Flexibility Guidelines for Behavioral Design – guidelines for allocating and designing behaviors that lead to more flexible design

6 hrs

7. Architectural view:

- a. Logical architecture: dependency, class visibility, sub systems
- b. Hardware architecture: deployment diagram notations, nodes, object migration between node
- c. Process architecture: what are process and threads and their notations in UML, object synchronization, invocation schemes for threads (UML notations for different types of invocations).
- d. Implementation architecture: component diagram notations and examples.

3 hrs

8. Reuse: Libraries, Frame works components and Patterns:

- a. Reuse of classes
- b. Reuse of components

- c. Reuse of frameworks, black box framework, white box frame
- d. Reuse of patterns: Architectural pattern and Design pattern

Term Work / Assignment: Each candidate will submit an approximately 10-page written report on a case study or mini project. Students have to do OO analysis & design for the project problem, and develop use case model, analysis model and design model for it, using UML.

Reference books:

1. Designing Flexible Object Oriented systems with UML – Charles Ritcher
2. Object Oriented Analysis & Design, Satzinger . Jackson,. Burd, Thomson
3. Object oriented Modeling and Design with UML :- James Rumbaugh, Micheal Blaha (second edition)
4. The Unified Modeling Language User Guide – Grady Booch , James Rumbaugh, Ivar Jacobson.
5. Object Oriented Modeling and Design – James Rumbaugh
6. Teach Yourself UML in 24 Hours - Joseph Schmullers
7. Object-Oriented Analysis and Design: using UML Mike O'Docherty Wiley Publication

Practical assignment : Nine assignments, one on each of the diagrams learnt in UML.

Network Security Lectures: 4 Hrs/week One paper: 100 marks / 3 Hrs duration		Tutorial :- 1 Hr / week Term Work : 25 marks
1	Introduction: Attacks, Services and Mechanisms, Security Attacks, Security Services, Integrity check, digital Signature, authentication, hash algorithms	3 hrs
2	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.	5 hrs
3	Hash Functions and Message Digests: Length of hash, uses, algorithms (MD2, MD4, MD5, SHA) MD2: Algorithm(padding, checksum, passes.) MD4 and 5: algorithm (padding, stages, digest computation.) SHA: overview, padding, stages.	4 hrs
4	Public key Cryptography: Algorithms, examples, Modular arithmetic (addition, multiplication, inverse, and exponentiation) RSA: generating keys, encryption and decryption. Other Algorithms: PKCS, Diffie- Hellman, El-Gamal signatures, DSS, Zero-Knowledge Signatures.	3 hrs
5	Authentication: Password Based, Address Based, Cryptographic Authentication. Passwords: in distributed systems, on-line vs off-line guessing, storing. Cryptographic Authentication: passwords as keys, protocols, KDC's, Certification Revocation, Inter-domain, groups, delegation. Authentication of People: Verification techniques, passwords, length of passwords, password distribution, smart cards, biometrics	4 hrs
6	Security Policies & Security Handshake Pitfalls: What is security policy, high and low level policy, user issues? Protocol problems, assumptions, Shared secret protocols, public key protocols, mutual authentication, reflection attacks, use of timestamps, nonce and sequence numbers, session keys, one- and two- way public key based authentication.	3 hrs

7	Example System: Kerberos: purpose, authentication, server and ticket granting sever, Keys and tickets, use of AS and TGS, replicated servers. Kerberos V4: names, inter-realm authentication, Key version numbers Kerberos V5: names, realms, delegation, forwarding and proxies, ticket lifetimes, revoking tickets, multiple Realms.	4 hrs
8	Network Security: Electronic mail security, IP security, Network management security	3 hrs
9	Security for electronic commerce: SSL, SET	3hrs
10	System security Intruders and Viruses, Firewalls, Intrusion Detection	3 hrs
	<u>Tutorials</u> 1. Numerical problems on DES, IDEA, MD2, MD5, Diffie-Helman and El-Gamal Signatures 2. Comparative study of network security tools 3. Vulnerability tools: Nessus, Retina, Wireshark, Nmap 4. Packet Sniffers: Tcpdump, Ettercap, Dsniff	
	Term Work :- Term work/Assignment :- Each candidate will submit a journal in which at least 10 assignments based on the above syllabus and the internal test paper. Test will be graded for 10 marks and assignments will be graded for 15 marks. References 1. Atul Kahate, Cryptography and Network Security, McGraw Hill 2. Kaufman, c., Perlman, R., and Speciner, M., . Network Security. Private Communication in a public world, 2nd ed., Prentice Hall PTR.,2002 3. Stallings, W.,. Cryptography and Network Security: Principles and Practice, 3rd ed., Prentice Hall PTR.,2003. 4. Stallings, W.Network security Essentials: Applications and standards. Prentice Hall, 2000 5. Cryptography & Network Security ;McGraw-Hill : Behrouz A Forouzan 6. Information Security Intelligence Cryptographic Principles & App. Calabrese Thomson 7. Securing A Wireless Network Chris Hurley SPD	

Advanced Database Techniques

Lectures: 4 Hrs/week

Practical: 3 Hrs /week

One paper: 100 marks / 3 Hrs duration

Practical exam: 50 marks

Term Work : 25 marks

1 Parallel and Distributed databases

9hrs

- Architecture for Parallel databases.
- Parallelizing Individual operations.
- Parallel query Evaluation.
 - Introduction to DDBMS
 - Architecture of DDBs
 - Storing data in DDBs
 - Distributed catalog management
 - Distributed query processing
 - Distributed concurrency control and recovery
 - Transaction Processing

2 Datawarehousing

6hrs

- Data Marts
- Getting data into the Data into the warehouse.
- Extraction
- Transformation
- Cleansing
- Loading
- Summarization
- Meta data
- Datawarehousing & ERP
- Datawarehousing & KM
- Datawarehousing & CRM

3 Planning & Project management

4

- How is it different ?
- Life-cycle approach
- The Development Phases
- Dimensional Analysis
- Dimensional Modeling
 - Star Schema
 - Snowflake Scheme

4	OLAP - 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	8hrs
5	Data Mining - Introduction - Data mining algorithms: ,clustering, Classification ,association rules. - Knowledge discovery: KDD process - Decision trees - Neural Networks Search Engines - Characteristics - Functionality - Architecture - Ranking of Web pages - The search engine Industry - The Enterprise Search Case Study: The analysis of a large scale hypertextual search engine	8hrs
6	Object Databases Systems Introduction - User-defined ADTs - Structured types - Object, object identity and references - Inheritance - Database design for ORDBMS - New challenges in implementing ORDBMS Storage & access methods Query processing & Optimization OODBMS Comparison between OODBMS and ORDBMS	8hrs
7	Database Security	2hrs

Term Work :- Term work/Assignment :- Each candidate will submit a journal in which at least 10 assignments based on the above syllabus and the internal test paper. Test will be graded for 10 marks and assignments will be graded for 15 marks.

References:

1. Raghu Ramakrishnan, Johannes Gerhke, "Database Management Systems" McGraw Hill
- 2 Decision supporter & database systems – Efreem G. Mallach
- 3 Datawarehousing fundamental – Paulraj ponniah Wiley
- 4 Introduction to data mining with case studies –G.K. Gupta
5. Elmasri and Navathe, "Fundamentals of Database Systems",
Pearson Education
6. Korth, Silberchatz, Sudarshan, "Database System Concepts"
McGraw Hill
7. Peter Rob and Coronel, "Database Systems, Design, Implementation
and Management", Thomson Learning.
8. Data Warehousing (Olap) S. Nagabhushana New Age

Software Project Management

Lectures: 4 Hrs/week

Tutorial :- 1 Hr / week

One paper: 100 marks / 3 Hrs duration

Term Work : 25 marks

1	Introduction 1.1 What is project? 1.2 What is project management 1.3 The Role of project manager 1.4 The project management profession 1.5 Project life cycle	3 hrs
2	Technology Context 2.1 A Systems View of Project Management 2.2 Understanding Organizations 2.3 Stakeholder Management 2.4 Project Phases and the Project Life Cycle 2.5 The Context of Information Technology Projects	4 hrs
3	Introduction 3.1 Developing the Project Schedule 3.2 Project Management Software Tools 3.3 Developing the Project Budget 3.4 Finalizing the Project Schedule and Budget 3.5 Monitoring and Controlling the Project 3.6 The Project Communications Plan 3.7 Project Metrics 3.8 Reporting Performance and Progress 3.9 Information Distribution	7 hrs
4	The Importance of Project Risk Management 4.1 Risk Management Planning 4.2 Common Sources of Risk on Information Technology Projects 4.3 Risk Identification 4.5 Qualitative Risk Analysis 4.6 Quantitative Risk Analysis 4.7 Risk Response Planning 4.8 Risk Monitoring and Control 4.9 Using Software to Assist in Project Risk Management	6 hrs
5	The Importance of Project Procurement Management 6.1 Planning Purchases and Acquisitions 6.2 Planning Contracting 6.3 Requesting Seller Responses 6.4 Selecting Sellers	7 hrs

	6.5 Administering the Contract 6.6 Closing the Contract 6.7 Using Software to Assist in project Procurement Management 6.8 Out Sourcing	
6	Change Management 7.1 The Nature of Change 7.2 The Change Management Plan 7.3 Dealing with Resistance and Conflict	6 hrs
7	Leadership & Ethics in Projects 8.1 Project Leadership 8.2 Ethics in Projects 8.3 Multicultural Projects	3 hrs
8	Introduction 9.1 Project Implementation 9.2 Administrative Closure 9.3 Project Evaluation	3 hrs
	References : 1. Information Technology Project Management : Kathy Schwalbe Thomson Publication 2. Information Technology Project Management Providing Measurable Organizational value Jack Marchewka WILEY INDIA 3. Applied Software Project Management Stellman & Greene SPD 4. Software Engineering Project Management by Richard Thayer , Edward Yourdon WILEY INDIA	

Electives

E-Business

Lectures: 4 Hrs/week

Tutorial :- 1 Hr / week

One paper: 100 marks / 3 Hrs duration

Term Work : 25 marks

Understanding the New Internet Economy

10 hrs

- a. Electronic Commerce Basics
 - i. The scope of Electronic commerce
 - ii. Definition of E-Commerce
 - iii. Electronic Data Interchange
- b. The Internet and World Wide Web
 - i. What is internet?
 - ii. A brief history of the internet
 - iii. The world wide web
 - iv. E-commerce versus E-business
- c. E-Business
 - i. E-business advantages and disadvantages
 - ii. E-business value chains
- d. E-business Models
 - i. Business-to-consumer(B2C)
 - ii. Business-to-business(B2B)
 - iii. Consumer-to-consumer(C2C)
 - iv. Consumer-to- Business (C2C)

Defining E-business idea

- a. The Entrepreneurial process
 - i. The entrepreneur
 - ii. The entrepreneurial process
- b. Factors affecting E-business success
 - i. The network effect
 - ii. Scalability
 - iii. Innovative web marketing ideas
 - iv. Ease of entry into electronic markets
 - v. Adaptability to change
- c. Exploiting E-business advantages

Traditional and Electronic Payment methods

- a. Traditional payment methods
 - i. A brief history of money and banking
 - ii. Checks and money orders
 - iii. Consumer credit, debit and charge cards
- b. Electronic credit, charge and debit card payments
 - i. Merchant accounts
 - ii. Payment-processing software
 - iii. Security for credit, debit and charge card processing
 - iv. Credit, debit and charge card fraud



- c. Other electronic payment forms
 - i. Early electronic cash
 - ii. Second-generation electronic cash products
 - iii. Smart cards
 - iv. Electronic checks
 - v. Person-to-person systems
 - vi. Prepaid cards and prepaid accounts
 - vii. M-commerce (Mobile commerce)

8 hrs

PART II - EDI to E-commerce

Electronic Data Interchange(EDI)

- i. Introduction to EDI
- ii. EDI Definition
- iii. The benefits of EDI
- iv. EDI Technology
- v. EDI Standards
- vi. EDI Software
- vii. EDI communication
- viii. VAN

Creating an E-Business Plan

- a. E-Business planning
 - i. Vision and mission statements
 - ii. Business description
 - iii. Products and services
 - iv. Industry analysis
 - v. Marketing, operation, financial and management plans
 - vi. Risk analysis
- b. Legal forms of organization for an E-business
- c. E-business partnerships

PART – III E-Business Planning and Implementation

17hrs

Building E-business

- a. Understanding legal issues
- b. Leasing commercial office space and hiring employees
- c. Building your brand
 - i. Branding
 - ii. Domain names
- d. Selecting the technology
 - i. Defining the enterprise
 - ii. ERP systems
 - iii. CRM systems
 - iv. Data mining
 - v. Independent software vendors and value-added resellers
- e. Identifying technology service providers



- i. Internet service providers
 - ii. Web hosting companies
 - iii. Application service providers
 - iv. System integrators and web integrators
- 7 **Designing an E-business Web site**
- a. Setting web site goals and objectives
 - i. Considering the web site's target audience
 - ii. Planning and budget
 - b. Analysing web site's structure
 - c. Recognising effective web design
 - i. Maintaining consistency
 - ii. Using navigation elements
 - iii. Using splash pages
 - iv. Using text and icon hyperlinks
 - v. Using text, colors, images and multimedia
 - vi. Using frames
 - vii. Using forms
 - d. Identifying web development tools
 - i. Web development software
 - ii. Outsourcing web design
 - e. Testing and maintaining a web site

- 8 **Launching E-Business**
- a. Testing your web site with a Beta Launch
 - b. Marketing an E-Business
 - i. Search engines and directories
 - ii. Public relations
 - iii. Consumer communication
 - iv. Newsgroups and forums
 - v. Affiliate programs
 - c. Other cost-effective promotion methods
 - d. E-business advertising
 - i. Banner ads
 - ii. Featured placement or sponsorships
 - iii. Opt-in e-mail or newsletters
 - iv. Traditional advertising
 - e. Benchmarking a web site
 - f. Measuring web site return on investment
 - g. Using online measurement tools
 - i. Log file analysis
 - ii. Third-party analysis tools
 - iii. Viewer tracking
 - iv. Web site traffic audit providers

9 **PART – IV Security Issues**

10 hrs

Cyber security

- a. Cyber attacks



- b. Hacking
- c. Firewalls
- d. Intrusion detection systems
- e. Secure socket layer
- f. Authentication and assurance of data integrity
- g. Cryptography based solutions
 - v. Symmetric key cryptosystems
 - vi. Asymmetric key cryptosystems
- h. Digital signatures
- i. The protocols for secure messaging
- j. Key management
- k. Public key certificates

10 **E-Business security**

- a. General E-Business security issues
- b. Network and web site security risks
 - i. Denial of service attacks
 - ii. Viruses
 - iii. Web site defacement
 - iv. Electronic industrial espionage
 - v. Credit card fraud and theft of customer data
 - vi. Data spills
- c. E-business security
 - i. Network and web security
 - ii. Transaction security and data protection
 - iii. Security audits and penetration testing
 - iv. Individual PC security risks
- d. E-business security providers
 - i. Security products
 - ii. Security services providers
- e. E business risk management issues

11 **Legal and Ethical Issues**

- a. Legal Issues
- b. Risks: Paper document versus electronic document
- c. Laws for E-commerce
- d. Legal issues for internet commerce
 - i. Copyrights and trademarks
 - ii. Content liability
 - iii. Information privacy
 - iv. Taxation
- e. Internet gambling
- f. Threats to children
- g. The special nature of computer ethics

Term work/ Assignment: Each candidate will submit a journal in which Case study based on the above syllabus and the internal test paper. Test graded for 10 marks and case study graded for 15 marks.

Reference Books

1. Creating a winning E-Business by Napier, Judd, Rivers, Wagner Course Technology Thomson Learning
2. E-Commerce Strategy, Technologies and Applications by David Whiteley McGraw Hill International editions
3. E-Commerce The cutting edge of business Kamlesh Bajaj and Debjani Nag ; Tata McGraw- Hill Publishing Company Ltd
4. E-Commerce and Indian Perspective P.T Joseph, S.J. PHI
5. E-commerce Fundamentals and Applications Henry Chan, Raymond Lee Tharam Dillon Elizabeth Chang Wiley India Edition
6. E-Business and Commerce Strategic thinking and practice by Brahm Canzer
7. Electronic Commerce by Gary P. Schneider Course Technology Thomson Learning

Embedded Systems Programming		
Lectures: 4 Hrs/week		Tutorial :- 1 Hr / week
One paper: 100 marks / 3 Hrs duration		Term Work : 25 marks
1.	Microprocessor platforms - an introduction Popular uP 6811, 8051, 80188, ARM7, ARM9 Memory types (EPROM, Flash, Flash Disk) Displays (LED, LCD, panel) I/O device - ADC, DAC, timers, UART, parallel port, USB Development prototype boards (one for the Lab work) JTAG built-in debugging	6 HRS
2.	Development Tools BSP (one for the Lab work WinCE .NET CF) SDK components, Runtime library Development Environment	8 HRS
3.	Embedded OS –Overview & Concepts linux - make, gcc, assembler, loader, locator Windows - VB.NET, .NET CF (Compact Framework) ADEOS type simple real-time operating system	6 HRS
4.	Embedded Programming differences Interrupt, Timer Interrupt, Timer Driver, Scheduler Memory map	4 HRS
5.	Embedded OS architecture Outline of Realtime, Time Triggered and Event Driven Structure Introduction to Embedded Linux WinCE, .NET CF, Embedded XP In details - one selected for Lab	8 HRS
6.	Special testing methods for the embedded system Debugging and testing methods Time sequence testing,	4 HRS
7.	Mobile Handheld Platform - specific programming tools Telephony protocols and OS support OS - Symbian OS, Pocket PC, Smartphone	4 HRS

Term Work :- Term work/Assignment :- Each candidate will submit a journal in which at least 10 assignments based on the above syllabus and the internal test paper. Test will be graded for 10 marks and assignments will be graded for 15 marks.

References :-

1. Embedded System Design Frank Vahid Wiley Pub.
2. Programming Embedded system in C and C++, O' reilly, SPD metrowreks. Com

Geographic Information Systems

Lectures: 4 Hrs/week

Tutorial :- 1 Hr / week

One paper: 100 marks / 3 Hrs duration

Term Work : 25 marks

	Lectures: 4 Hrs/week Tutorial :- 1 Hr / week One paper: 100 marks / 3 Hrs duration Term Work : 25 marks	
1	Introduction to GIS and GIS software 1. What Are Geographic Information Systems, 2. Developing Spatial Awareness. 3. Spatial Measurement Levels. 4. Spatial Location and Reference. 5. Spatial Patterns. Geographic Data Collection. Populations and Sampling Schemes. Making Inferences from Samples. 6. Abstract Nature of Maps. Map Characteristics.	4 hrs
2	GIS Basics: layers, raster/vector, attributes 1. Raster Models. 2. Compact Storing of Raster Data. 3. Commercial Raster Compaction Products. 4. Vector Models. 5. Compacting Vector Data Models. 6. A Vector Model to Represent Surfaces. 7. Hybrid and Integrated Systems.	6 hrs
3	Geo-referencing and projections , Data input and data sources 1. Primary Data. Input Devices. 2. Raster, Vector, or Both. Reference Frameworks and Transformations. Map Preparation and the Digitizing Process. 3. What to Input. Methods of Vector Input. Methods of Raster Input. Remote Sensing as a Special Case of Raster Data Input GPS data input. 4. Secondary Data. 5. Metadata and Metadata Standards. 6. Storage of GIS Databases. 7. The Importance of Editing the GIS Database. 8. Detecting and Editing Errors of Different Types. 9. Entity Errors: Vector. 10. Attribute Errors: Raster and Vector. 11. Dealing with Projection Changes. 12. Joining Adjacent Maps: Edge Matching. Conflations, Templating.	8 hrs

4	GIS applications in Sectors (say health studies, urban development, education, land management) 1. Archive Emphasizing Applications. 2. Pattern Detection and Characterization Emphasizing Applications. 3. Pattern Exploitation Emphasizing Applications. 4. Pattern Comparison Emphasizing Applications. 5. Space-Time Emphasizing Applications. 6. Predictive Modeling Applications.	4 hrs
5	Analysis in GIS 1. Introduction to GIS Spatial Analysis. GIS Data Query. 2. Locating and Identifying Spatial Objects. Defining Spatial Characteristics. Point Attributes. Line Attributes. Area Attributes. 3. Working with Higher-Level Objects. Measuring Length of Linear Objects. Measuring Polygons, Measuring Shape. Measuring Polygon Shape. Measuring Distance. 4. Classification. Classification Principles. Elements of Reclassification. 5. Neighborhood Functions. Immediate Neighborhoods. Extended Neighborhoods. Buffers.	6 hrs
7	Digital Elevation Models (DEMs) and Raster analysis 1. Surface Mapping. 2. Sampling the Statistical Surface. 3. The DEM. 4. Raster Surfaces. Interpolation. Linear Interpolation. Methods of Nonlinear Interpolation. Problems of Interpolation. 5. Terrain Reclassification. 6. Steepness of Slope. 7. Azimuth or Orientation (Aspect). 8. Shape or Form. 9. Visibility and Intervisibility. 10. Slicing the Statistical Surface. Cut And Fill.	5 hrs
6	Cartographic Modeling. 1. The Cartographic Model. Types Of Cartographic Models. 2. Inductive and Deductive Modeling. 3. Factor Selection. Model Flowcharting. Working Through the Model. Conflict Resolution. Some Example Cartographic Models. Model Implementation. Model Verification.	6 hrs

8	GIS Output 1. Output: The Display of Analysis. 2. Cartographic Output. 3. The Design Process. 4. Map Design Controls. 5. Nontraditional Cartographic Output. 6. GIS on the Internet. 7. Noncartographic Output. 8. Interactive Output.	5 hrs
	Term Work :- Term work/Assignment :- Each candidate will submit a journal in which at least 10 assignments based on the above syllabus and the internal test paper. Test will be graded for 10 marks and assignments will be graded for 15 marks. References : 1. Geographical Information System- An Introduction 3rd Edition By Tor Bernhardsen, WILEY INDIA 2. Information Technology Project Management : Kathy Schwabe Thomson Publication 3. Information Technology Project Management Providing Measurable Organizational value Jack Marchewka WILEY INDIA 4. Applied Software Project Management Stellman & Greene SPT 5. Software Engineering Project Management by Richard Taylor Edward Yourdon WILEY INDIA	

Customer Resource Management

Lectures: 4 Hrs/week

Tutorial :- 1 Hr / week

One paper: 100 marks / 3 Hrs duration

Term Work : 25 marks

1	<u>Introduction to CRM and eCRM:</u> What is customer? How do we define CRM? CRM technology components, customer life style, customer interaction. Defference between CRM and eCRM, features of eCRM	6 hrs
2	<u>Sales Force Automation(SFA)</u> Definition and need of SFA, barriers to successful SFA, SFA functionality, technological aspect of SFA , data synchronization, flexibility and performance, reporting tools.	6hrs
3	<u>Enterprise Marketing Automation(EMA)</u> Components of EMA, marketing campaign, campaign planning and management, business analytic tools, EMA components (promotions, events loyalty and retention programs), response management	6 hrs
4	<u>Call Center</u> Meaning, customer interaction, the functionality, technological implementation, what is ACD(Automatic Call Distribution), IVR (Interactive Voice Response), CTI (Computer Telephony Integration), web enabling the call center, automated intelligent call routing, logging & monitoring	6 hrs
5	<u>Implementing CRM</u> Pre implementation , kick off meeting, requirements gathering, prototyping and detailed proposal generation, development of customization, Power User Beta Test and Data import, training, roll out and system hand off, ongoing support , system optimization, follow up.	6 hrs
6	<u>Introduction to Application Service Provider (ASP)</u> Who are ASP's ? their role and function , advantages and disadvantages of implementing ASP	6 hrs
7	<u>Impact of CRM on Marketing Channels</u> Meaning, how does the traditional distribution channel structure support customer relationship, emerging channel trends that impact CRM	6 hrs
8	<u>Case studies</u>	3hrs

References :

1. CRM at the speed of light by Paul Greenberg, TMH 2nd edition
2. Customer Relationship Management by V, Kumar, Werner J, Reinartz, WILEY India Edition H
3. Customer Relations Management by Zikmund WILEY India Edition H
4. Customer Relations Management by Kristin Anderson and Carol Kerr, TM

Assignments

STUDENTS has to submit 7 ASSINGMENTS

Case study:

Present a report of 10-15 pages on any topics from syllabus

Artificial Intelligence

Lectures: 4 Hrs/week

One paper: 100 marks / 3 Hrs duration

Tutorial :- 1 Hr / week

Term Work : 25 marks

- 1 **Introduction to Artificial Intelligence:** 4 hours
A Definition, underlying assumption, what is AI, A.I. technique, different models of Intelligence
- 2 **Problem Solving:** 4 hours
Problems and problem spaces: defining the problem, production systems, control strategies, Heuristic searches, Problem characteristics, Production system characteristics,
- 3 **Basic Problem Solving Methods:** 4 hours
Forward versus backward reasoning, Problem Trees versus Problem Graphs, Knowledge representation and the Frame problem, Matching
- 4 **Knowledge Representation Using Predicate Logic:** 8 hours
Introduction to Representation, representing simple facts in Logic, Augmenting the Representation, with Computable functions and Predicates, Uncertainty and Bayesian Network (brief introduction only)
- 5 **Natural Language Understanding:** 4 hours
Introduction, Understanding single sentences, Understanding multiple sentences, Language generation, Machine Translation
- 6 **Neural Networks and Fuzzy Systems:** 8 hours
Neural and fuzzy machine Intelligence, Fuzziness as Multivalence, The Dynamical Systems approach to Machine Intelligence, The brain as a dynamical system, Neural and fuzzy systems as function Estimators, Neural Networks as trainable Dynamical system, Fuzzy systems and applications, Intelligent Behavior as Adaptive Model free Estimation, Generalization and creativity, Learning as change, Symbol vs Numbers, Rules vs Principles, Expert system Knowledge as rule trees, Symbolic vs Numeric Processing, Fuzzy systems as Structured Numerical estimators, Generating Fuzzy rules with product space Clustering, Fuzzy Systems as Parallel associators, Fuzzy systems as Principle based Systems
- 7 **Genetic Algorithms:** 4 Hours
A simple genetic algorithm, A simulation by hands, similarity templates(Schemata), Mathematical foundations, Schema Processing at work, The two- armed and k-armed Bandit Problem, The building block hypothesis, The minimal Deceptive Problem

Term Work :- Term work/Assignment :- Each candidate will submit a journal in which at least 10 assignments based on the above syllabus and the internal test paper. Test will be graded for 10 marks and assignments will be graded for 15 marks.

Reference Books:

1. "Artificial Intelligence", by Elain Rich, McGRAW-HILL International Book Company
2. "Artificial Intelligence & Intelligent System", Pandey Oxford Press
3. "Artificial Intelligence" by Rob Callan, Palgrave Macmillan
4. "Introduction to Artificial Intelligence" By Eugene Charniak, Drew McDermott-Addison Wesley
5. "Neural Networks and fuzzy systems A dynamical systems approach to machine Intelligence" by Bart Kosko- PHI
6. "Genetic Algorithms in search, Optimization & Machine Learning" by David E Goldberg-Addison wesley

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