

SCHEME OF EXAMINATION

&

DETAILED SYLLABUS

(w. e. f. Academic Year 2010-2011)

For

MASTER OF COMPUTER APPLICATIONS (MCA) DEGREE

Fourth Semester



**GURU GOBIND SINGH INDRAPRASTHA UNIVERSITY
KASHMERE GATE, DELHI - 110403
SCHEME OF EXAMINATIONS**

Master of Computer Applications

FOURTH SEMESTER EXAMINATION

Paper ID	Paper Code	Paper	L	T/P	Credit
044202	MCA 202	Design and Analysis of Algorithms	3	1	4
044204	MCA 204	Data Warehousing and Data Mining	3	1	4
044206	MCA 206	Advanced Computer Networks	3	1	4
044208	MCA 208	Object Oriented Analysis and Design	3	1	4
044210	MCA 210	Web Technologies	3	1	4
		Practical			
044252	MCA 252	Design and Analysis of Algorithms Lab	0	2	1
044254	MCA 254	Data Warehousing and Data Mining Lab	0	2	1
044256	MCA 256	Advanced Computer Networks Lab	0	2	1
044258	MCA 258	Object Oriented Analysis and Design Lab	0	2	1
044260	MCA 260	Web Technologies Lab	0	2	1
		NUES			
044262	MCA 262	General Proficiency – IV* (It is suggested to have Process Modeling Management Oriented Course)	0	2	1
		Total	15	17	26

* Non-University Examination System (NUES)

INSTRUCTIONS TO PAPER SETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks including subparts, if any.

OBJECTIVE: *In this course, students will learn how:*

- *To design new algorithms based on standard algorithm-design strategies.*
- *To analyze the time and space usage and correctness of new algorithms based on standard algorithm-analysis techniques.*
- *To apply and adapt fundamental algorithms (sorting, searching, order statistics, graph algorithms) to new situations.*
- *To solve problems and to express your solutions using the language and concepts of algorithms and its mathematical tools.*

PRE-REQUISITES

- Programming in C
- Data Structure in C
- Discrete Mathematics

UNIT - I

Notion of Algorithm, Growth of functions, Summations, Recurrences: The substitution method, The iteration method, Asymptotic Notations and Basic Efficiency Classes. Use of Big O, θ , Ω in analysis. Mathematical Analysis of few Non-recursive and Recursive Algorithms, Proof of Correctness. **[No of Hrs.: 10]**

UNIT - II

Sorting and Searching Techniques, Selection Sort, Bubble Sort, Insertion Sort, Sequential Search Binary Search, Depth first Search and Breadth First Search, Balanced Search trees, AVL Trees, Red-Black trees, Heaps and Heap sort, Hash Tables, disjoint set and their implementation, Divide and conquer Paradigm of Problem solving, complexity analysis and understanding of Merge sort, Quick Sort, Binary Search Trees, Sorting in linear time, Medians and Order statistics. **[No of Hrs.: 10]**

UNIT - III:

Greedy Techniques, Prim's Algorithm, Kruskal's Algorithm, Dijkstra's and Bellman Ford Algorithm, Huffman trees. Knapsack Problem, Dynamic Programming paradigm, Warshall's and Floyd's Algorithm, Optimal Binary Search trees, Matrix multiplication Problem, 0/1 Knapsack Problem, maximum network flow problem, naive string matching algorithm, string matching with finite automata Knuth morris Pratt algorithm, The Rabin-Karp Algorithm. **[No of Hrs.: 10]**

UNIT - IV

Backtracking, n-Queen's Problem, Hamiltonian Circuit problem, Subset-Sum problem, Branch and bound, Assignment problem, travelling salesman problem. Introduction to Computability, Polynomial-time verification, NP-Completeness and Reducibility, NP-Completeness Proof, NP-Complete problems, Proof of cook's theorem. **[No of Hrs.: 10]**

TEXT BOOKS

1. Jon Kleinberg and Eva Tardos, “Algorithm Design”, Pearson Edition, 2006.
2. Richard Neapolitan and Kumarss Naimipour, “Foundations of Algorithms”, Jones & Bartlett, 2004.
3. T.H. Cormen, C.E. Leiserson, R.L. Rivest and C. Stein, “Introduction to Algorithms” PHI, 3rd Ed., 2009.

REFERENCES:

1. Johnsonbaugh , “Algorithms”, Pearson, 2004.
2. Anany Levitin, “Introduction to the Design and Analysis of Algorithm”, Pearson Education, 2003.
3. Sara Baase and Allen Van Gelder, “Computer Algorithms - Introduction to Design and Analysis”, Pearson Education, 2003.
4. A.V. Aho, J. E. Hopcroft and J.D.Ullman, “The Design and Analysis of Computer Algorithms”, Pearson Education, 2003.
5. R. S. Salaria, Khanna, “Data Structure & Algorithms”, Book Publishing Co. (P) Ltd., 2002.
6. R. Panneerselvam, “Design and Analysis of Algorithm”, PHI, 2007.
7. Steven S. Skiena , “Algorithm Design Manual”, Springer, 1998.
8. Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran, “Fundamental of Computer Algorithms”, OrientLongman , 2006.

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OBJECTIVES: *This course is an attempt to provide you with the basic information about data ware house and their development. This course also provides the basic conceptual background necessary to design and develop data ware house applications.*

PRE-REQUISITE:

- Information System Concepts

UNIT- I

The Compelling Need for data warehousing: Escalating Need for strategic information, failures of Past decision-support systems, operational versus decision-support systems, data warehousing – the only viable solution, data warehouse defined Data warehouse – The building Blocks: Defining Features, data warehouses and data marts, overview of the components, metadata in the data warehouse Defining the business requirements: Dimensional analysis, OLAP operations : Drill-down and roll-up, slice-and-dice or rotation.

[No. of Hrs: 11]

UNIT- II

Principles of dimensional modeling: , the STAR schema, STAR Schema Keys, Advantages of the STAR Schema Dimensional Modeling: Updates to the Dimension tables, miscellaneous dimensions, the snowflake schema, aggregate fact tables, families of STARS ,Steps for the Design & Construction of Data warehouse : Framework , Architecture , Type of OLAP Servers : ROLAP , MOLAP , Data warehouse implementation tolls & techniques.

[No. of Hrs.: 10]

UNIT- III

Data Mining, Data Mining of what kind of Data , Knowledge discovery process (KDD) , What kind of patterns can be mined , OLAP versus data mining, data mining and the data warehouse, Data mining functionalities, classification Systems , Data processing : Cleaning , Integration & transformation, Reduction . Data Mining primitives: What defines a Data Mining Task.

[No. of Hrs.: 10]

UNIT- IV

Data Mining Query language (DMQL), Cluster Analysis : Partitioning , Hierarchical Density , Grid & Model based methods ., Major Data Mining Techniques, Cluster detection, decision trees, memory-based reasoning, link analysis, neural networks, genetic algorithms, moving into data mining, Data Mining Applications, Benefits of data mining & applications.

[No. of Hrs.: 11]

TEXT BOOKS:

1. Paul Raj Poonia, "Fundamentals of Data Warehousing", John Wiley & Sons, 2003.
2. W. H. Inmon, "Building the Operational Data Store", 2nd Ed., John Wiley, 1999
3. Sam Anahony, "Data Warehousing in the Real World: A Practical Guide for Building Decision Support Systems", John Wiley, 2004.
4. Jarke, "Fundamentals of Data Warehouse", Springer

REFERENCES:

1. Kamber and Han, "Data Mining Concepts and Techniques", Hartcourt India P. Ltd., 2001.
2. G. K. Gupta, "Introduction to Data Mining with Case Studies", PHI, 2006.
3. A. B. M. Shawkat Ali, Saleh A. Wasimi, "Data Mining Methods and Techniques", Cengage Learning, 2009.
4. Pang - Ning, Michael- Steinbach, "Introduction to Data Mining", Pearson, 4th Ed., 2009.

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OBJECTIVE:

- To grasp the current directions of computer networks research.
- To fill in gaps in students' networking knowledge.
- To better understand experimental methodology.

PREREQUISITE:

- Data Communications and Networking

UNIT - I

Introduction : Overview of computer network, seven- layer architecture, TCP/IP suite of protocol, etc, Mac protocol for high speed LANS, MAN's & WIRELESS LANs (for example, FDDI, DQDB, HIPPI, Gigabit Ethernet, Wireless Ethernet etc) Fast access technologies.(For example, ADSL, cable Modem Etc.), Wi Fi, Wimax. [No. of hrs: 10]

UNIT – II

IPV6: Why IPV6, basic protocol, extension & option, support for QS, Security, etc, neighbor discover, auto-configuration, routing, Change to other protocols, Application programming interface for IPV6.6 bone. **ATM:** Introduction, ATM reference Model, AAL layers, AAL0, AA1, AAL2, AAL3/4, AAL5 [No. of hrs: 12]

UNIT – III

Mobility in network, mobile, Security related issues. **IP Multicasting:** Multicasting routing protocols, address assignment, session discovery, etc. [No. of hrs: 10]

UNIT-IV

TCP extensions for high – speed networks, transaction – oriented application, other new option in TCP. **Network security at various layers:** Secure-HTTP, SSP, ESP, Authentication header, key distribution protocols, Digital signatures, digital certificates. [No. of hrs: 10]

TEXT BOOKS:

1. W. ER. Stevens, "TCP/IP illustrated, Volume 1: The protocols", Addison Wesley, 1994.
2. G. R. Wright, "TCP/IP illustrated volume 2. The Implementation", Addison Wesley , 1995.
3. Frouzan, "TCP/IP Protocol Suite", Tata Mc Graw Hill, 4th Ed., 2009.

REFERENCES:

1. William Stallng, "Cryptography and Network Security", Pearson Publication.
2. James Martin, Joseph Lebin, Kavanagh Chapman "Asynchronous Transfer Mode: ATM Architecture and Implementation", Prentice Hall PTR, Facsimile Ed.
3. Nader F. Mir, "Computer and Communication Networks", Pearson, 2009.

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OBJECTIVE: *The objective of the course is to give students a detailed understanding of processes and techniques for building large object-oriented software systems. To develop skills to evolve object-oriented systems from analysis, to design, to implement and to understand most of the major object-oriented technologies including basic OO concepts, processes, languages, databases, user interfaces, frameworks, and design patterns.*

PRE-REQUISITE:

- Software Engineering Concepts
- Object Oriented Programming Concepts

UNIT - I

Review of Object modeling, new paradigm, object oriented thinking-rethinking, Objects and Classes. Links and association, Generalization and specialization, Inheritance, Grouping concepts, aggregation, composition, abstracts classes, Polymorphism, Metadata, Constraints, Reuse. Object Oriented Lifecycle Model, Introduction to Object Oriented Methodology, Overview of various object oriented methodologies- OOD, HOOD, OMT, CRC, OOA, OOSA, OOSE, OOSD, OORASS. [No. of Hrs.: 12]

UNIT - II

Architecture: Introduction, System development is model building, model architecture, requirements model, analysis model, the design model, the implementation model, test model.
Analysis: Introduction, the requirements model, the analysis model. [No. of Hrs.: 09]

UNIT - III

Construction: Introduction, the design model, block design, working with construction.
Testing: introduction, on testing, unit testing, integration testing, system testing, the testing process. [No. of Hrs.: 09]

UNIT - IV

Modeling with UML: Origin of UML, 4+1 view architecture of UML, Basic Building Blocks of UML, A Conceptual Model of UML, Basic Structural Modeling, UML Diagrams. Case Studies. [No. of Hrs.: 12]

TEXT BOOKS:

1. Ivar Jacobson, "Object Oriented Software Engineering", Seventh Impression, Pearson, 2009.
2. Grady Booch, James Rumbaugh, Ivar Jacobson, "The UML User Guide", 2nd Edition, Pearson, 2008.

REFERENCES:

1. Stephen R. Scach, "Classical & Object Oriented Software Engineering with UML and Java", McGraw Hill, 1999.
2. Richard C. Lee, William M. Tepfenhard, "UML and C++, A Practical guide to object-oriented Development", Pearson.
3. Ivar Jacobson, Grady Booch & James Rumbaugh, "The Unified Software Development Process", Pearson, Fifth Impression, 2009.
4. Bernd Bruegge, "Object Oriented Software Engineering", Pearson, 2nd Ed., 2008.
5. James R. Rumbaugh , Michael R. Blaha , William Lorensen , Frederick Eddy ,William Premerlani , "Object-Oriented Modeling and Design ", 2nd Edition, PHI, 2007.
6. Mahesh P. Matha, "Object Oriented Analysis and Design using UML", PHI, 2008.
7. Michael R. Blaha, James R. Runbaugh, "Object Oriented Modeling and Design with UML", Pearson, 2nd Ed.

Code No.: MCA 210
Paper: Web Technologies

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OBJECTIVE: *In this course student will learn how to design and develop a dynamic website. This course also provides some basic knowledge of web services which are useful for the same.*

PRE-REQUISITE:

- Web Designing Tools
- Object-Orientated Paradigm
- Concept of a Namespace

UNIT-I

Overview of Internet and web, HTML Tags, Forms & Frames , Introduction to Java Script and Cascading Style Sheets, DHTML, Using various Web Design Tools like Dream Weaver , Gif Animator etc
[No. of Hrs 10]

UNIT-II

ASP.Net, **Working with ASP.Net Web Forms:** Building ASP.Net Page, Building Forms with Web Server Controls, Performing Form Validation with Validation Control, Advanced Control Programming. **Working with ADO.Net:** Introduction to ADO.Net, Binding Data to web Control, Using the DataList and DataGrid Controls, Working with DataSets, Working with XML.
[No. of Hrs 10]

UNIT-III

Working with ASP.Net Applications: Creating ASP.Net Application, Tracking User Sessions, Caching ASP.Net Application, Application Tracking and Error Handling. Securing ASP.Net Applications: Using Form-Based Authentication, Using Windows-Based Authentication, Encrypting Data over the Network.
[No. of Hrs 10]

UNIT-IV

Web Services: Introduction to Service-Oriented Architectures, XML basics, SOAP, SOAP message structure, WSDL, UDDI, Overview of Grid and Cloud Computing.
Latest trends in Web technologies. A Case Study for developing interactive web applications
[No. of Hrs 12]

TEXT BOOKS:

1. K. K. Sharma, "Web Technology", A.B. Publication Delhi, First Edition, 2008.
2. Stephen Walther, "ASP.NET", Pearson Education, Second Edition, 2004.
3. Ethan Cerami, "Web Services", O'Reilly Media, 2002.
4. Achyut S Godbole and Atul Kahate, "Web Technologies", Tata McGraw Hill.
5. Heith Morneau, "Active Server Pages", Vikas Publishing House.

REFERENCES:

1. Raj Kamal , "Internet and Web Technologies", TMH.

Syllabus of Master of Computer Applications (MCA), approved by MCA Coordination Committee on 7th May 2010 & Sub-Committee Academic Council held on 31st May 2010. W.e.f. academic session 2010-11

2. Deitel, "Internet & World Wide Web , How to Program", PHI.
3. V. K. Jain, "Advanced programming in Web Design", Cyber tech.
4. Rick Dranell, "HTML4 unleashed", Techmedia Publication, 2000.
5. T. M. Ramachandran , "Internet & Web development", Dhruv.
6. James L Mohler and Jon Duff, "Designing interactive web sites", Delmar Thomson Learning.
7. Ivan Bay Ross, "HTML, DHTML, Java script, Perl CGI", BPB.
8. Kathleen Kalata, "Web Application using ASP.net 2.0", 2nd Ed. , 2009.
9. Anders Moller, Michael Schwartzcach, "An Introduction to XML and Web Technologies", Pearson, 2009.
10. Malt. J. Crouch, "ASP.net and VB.net Web Programming", Pearson, 2002.
11. Jeffrey C. Jackson, "Web Technologies- A Computer Science Perspective", Pearson, 2005.

Practical will be based on following:

- | | |
|---|----------------|
| 1. Design and Analysis of Algorithm Lab | MCA 212 |
| 2. Data Warehousing and Data Mining Lab | MCA 214 |
| 3. Advance Computer Networks Lab | MCA 216 |
| 4. Object Oriented Analysis and Design | MCA 218 |
| 5. Web Technologies Lab | MCA 220 |

Code No. : MCA 262

Paper: General Proficiency – IV*

It is suggested to have a fundamental course on Process Modeling (Management Oriented) in this semester.

This paper is under Non University Examination system its detail content will be decided by the respective Institute, under approval of the coordination committee based on the requirement of individual institution.

***Non University Examination Scheme (NUES)**

There will not be any external examination of the university. The performance of the candidates should continuously be evaluated by an internal committee. The committee may conduct viva-voce at the end for the award of the marks.