

**Regular Course (Scheme and Syllabus)**

**MASTER OF COMPUTER APPLICATIONS (MCA)**

**Faculty of Information Technology and Computer Science**

Deenbandhu Chhotu Ram University of Science & Technology, Murthal (Sonapat),  
Haryana, India

From Session: 2011-12

**Scheme & Syllabi**  
**of**

**MASTER OF COMPUTER APPLICATIONS (MCA)**  
**(3-years Graduate Programme)**

Faculty of Information Technology and Computer Science

Deenbandhu Chhotu Ram University of Science &  
Technology, Murthal (Sonapat)-131039, India

## Regular Course (Scheme and Syllabus)

### MASTER OF COMPUTER APPLICATIONS (MCA)

Faculty of Information Technology and Computer Science

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**From Session: 2011-12**

#### MCA – 1<sup>st</sup> Semester

Sr. No.	Paper Code	Title of Paper	L	T	P	Sessional	Theory	Practical	Total	Credit
1.	MCA-101	Computer Fundamentals & Programming in C	3	1	-	50	100	-	150	4
2.	MCA-103	Computer Organisation	3	1	-	50	100	-	150	4
3.	MCA-105	Discrete Mathematical Structure	3	1	-	50	100	-	150	4
4.	MCA-107	Software Engineering	3	1	-	50	100	-	150	4
5.	MCA-109	Optimization Techniques & Statistical Methods Using C	3	1	-	50	100	-	150	4
6.	MCA-121	Software Lab.-I, C (Based on MCA-101)	-	-	3x 2	50	-	50	100	3
7.	MCA-129	Software Lab.-II, C (Based on MCA-105)	-	-	3x 2	50	-	50	100	3
8.	MCA-131	Seminar	-	-	-	100	-	-	100	1
		<b>Total</b>	<b>15</b>	<b>5</b>	<b>12</b>	<b>450</b>	<b>500</b>	<b>100</b>	<b>1050</b>	<b>27</b>

#### MCA – 2<sup>nd</sup> Semester

Sr. No.	Paper Code	Title of Paper	L	T	P	Sessional	Theory	Practical	Total	Credit
1.	MCA-102	Introduction to Internet & Web Designing	3	1	-	50	100	-	150	4
2.	MCA-104	Data Structures	3	1	-	50	100	-	150	4
3.	MCA-106	Computer Networks	3	1	-	50	100	-	150	4
4.	MCA-108	System Simulation	3	1	-	50	100	-	150	4
5.	MCA-110	Object Oriented Systems and C ++	3	1	-	50	100	-	150	4
6.	MCA-124	Software Lab.-III, C (Based on MCA-202)	-	-	3x 2	50	-	50	100	3
7.	MCA-130	Software Lab.-IV, C++ (Based on MCA-205)	-	-	3x 2	50	-	50	100	3
8.	MCA-132	Seminar	-	-	-	100	-	-	100	1
		<b>Total</b>	<b>15</b>	<b>5</b>	<b>12</b>	<b>450</b>	<b>500</b>	<b>100</b>	<b>1050</b>	<b>27</b>

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#### MCA – 3<sup>rd</sup> Semester

Sr. No.	Paper Code	Title of Paper	L	T	P	Sessional	Theory	Practical	Total	Credit
1.	MCA-201	Data Base Management Systems	3	1	-	50	100	-	150	4
2.	MCA-203	Visual Programming using VB	3	1	-	50	100	-	150	4
3.	MCA-205	Operating Systems	3	1	-	50	100	-	150	4
4.	MCA-207	Advance Computer Architecture	3	1	-	50	100	-	150	4
5.	MCA-209	Managerial Information Systems	3	1	-	50	100	-	150	4
6.	MCA-221	Software Lab.-V, (Based on MCA-301 & MCA-302)	-	-	3x 2	50	-	50	100	3
7.	MCA-223	Minor Project ( Based on MCA-301 and MCA-302)	-	-	3x 2	50	-	50	100	3
8.	MCA-231	Seminar	-	-	-	100	-	-	100	1
		<b>Total</b>	<b>15</b>	<b>5</b>	<b>12</b>	<b>450</b>	<b>500</b>	<b>100</b>	<b>1050</b>	<b>27</b>

#### MCA – 4<sup>th</sup> Semester

Sr. No.	Paper Code	Title of Paper	L	T	P	Sessional	Theory	Practical	Total	Credit
1.	MCA-202	Computer Graphics & Multimedia	3	1	-	50	100	-	150	4
2.	MCA-204	JAVA Programming	3	1	-	50	100	-	150	4
3.	MCA-206	Data Warehousing and Mining	3	1	-	50	100	-	150	4
4.	MCA-208	Elective – I	3	1	-	50	100	-	150	4
5.	MCA-210	Elective – II	3	1	-	50	100	-	150	4
6.	MCA-222	Software Lab.-VI, C (Based on MCA-401)	-	-	3x 2	50	-	50	100	3
7.	MCA-224	Software Lab.-VII, JAVA (Based on MCA-402)	-	-	3x 2	50	-	50	100	3
8.	MCA-232	Seminar	-	-	-	100	-	-	100	1
		<b>Total</b>	<b>15</b>	<b>5</b>	<b>12</b>	<b>450</b>	<b>500</b>	<b>100</b>	<b>1050</b>	<b>27</b>

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#### **Electives I**

CSE-208(A)-Information Security

CSE-208(B)- Commerce

CSE-208(C)-Linux and Shell Programming

CSE-208(D)-Software Quality Assurance and Testing

CSE-208(E)-Design and Analysis of Algorithm

#### **Electives II**

CSE-210(A)-Internet and Intranet Engineering

CSE-210(B)-Distributed Operating Systems

CSE-210(C)-Principles of Programming Language

CSE-210(D)-Network Management and Programming

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### MCA – 5<sup>th</sup> Semester

Sr. No.	Paper Code	Title of Paper	L	T	P	Sessional	Theory	Practical	Total	Credit
1.	MCA-301	Artificial Intelligence	3	1	-	50	100	-	150	4
2.	MCA-303	Advanced Java Programming	3	1	-	50	100	-	150	4
3.	MCA-305	Web Technology	3	1	-	50	100	-	150	4
4.	MCA-307	Elective – III	3	1	-	50	100	-	150	4
5.	MCA-309	Elective – IV	3	1	-	50	100	-	150	4
6.	MCA-323	Software Lab. - VIII, Java (Based on MCA-502)	-	-	3x 2	50	-	50	100	3
7.	MCA-325	Software Lab. - IX, XML, ASP, JSP, Perl (Based on MCA-503)	-	-	3x 2	50	-	50	100	3
8.	MCA-331	Seminar	-	-	-	100	-	-	100	1
		<b>Total</b>	<b>15</b>	<b>5</b>	<b>12</b>	<b>450</b>	<b>500</b>	<b>100</b>	<b>1050</b>	<b>27</b>

#### Electives III

- MCA-307(A)-Compiler Construction
- MCA-307(B)-Object Oriented Analysis And Design
- MCA-307(C)-Theory of Computation
- MCA-307(D)-Human Computer Interaction
- MCA-307(E)-Professional Issues in I.T.

#### Electives IV

- MCA-309(A)-Programming in C #
- MCA-309(B)-Software Project Management
- MCA-309(C)-Artificial Neural Networks
- MCA-309(D)-Fuzzy Logic

### MCA – 6<sup>th</sup> Semester

MCA-302 Project Work/Dissertation  
(100 Project/Dissertation, 100 Viva-voce, 50 Internal Assessment) **250**

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### MCA – 1<sup>st</sup> Semester

Sr. No.	Paper Code	Title of Paper	L	T	P	Sessional	Theory	Practical	Total	Credit
1.	MCA-101	Computer Fundamentals & Programming in C	3	1	-	50	100	-	150	4
2.	MCA-103	Computer Organisation	3	1	-	50	100	-	150	4
3.	MCA-105	Discrete Mathematical Structure	3	1	-	50	100	-	150	4
4.	MCA-107	Software Engineering	3	1	-	50	100	-	150	4
5.	MCA-109	Optimization Techniques & Statistical Methods Using C	3	1	-	50	100	-	150	4
6.	MCA-121	Software Lab.-I, C (Based on MCA-101)	-	-	3x 2	50	-	50	100	3
7.	MCA-129	Software Lab.-II, C (Based on MCA-105)	-	-	3x 2	50	-	50	100	3
8.	MCA-131	Seminar	-	-	-	100	-	-	100	1
		<b>Total</b>	<b>15</b>	<b>5</b>	<b>12</b>	<b>450</b>	<b>500</b>	<b>100</b>	<b>1050</b>	<b>27</b>

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### MCA-101 Computer Fundamentals and Programming in C

**Note:** Total **8 Questions** are to be set by the examiner covering the entire syllabus uniformly. **Question No. 1 (COMPULSORY)** having **Objective Type Questions** of **2 marks** from entire syllabus. Rest of the **Seven** questions are from **Section A, B & C** of **Syllabus**. A candidate is required to attempt any **Four questions** out of Sections A, B & C by selecting **ATLEAST ONE** Question from Each Section. All questions shall carry equal marks.

**Total Marks : 150**

**Theory Paper : 100**

**Internal Assessment : 50**

**Minimum Pass Marks : 40%**

**Maximum Time : 3 Hrs.**

#### Section – A

**Computer Fundamentals:** Computer components, characteristics & classification of computers, hardware & software, peripheral devices, system software, application software, compiler, interpreter, utility program, programming languages.

**Algorithmic Development:** Techniques of problem solving, Flowcharting, decision table, Structured programming concepts, Modular Programming, Algorithms for searching, sorting and merging, Programming methodologies: top-down and bottom-up programming.

**Operating system:** Definition and significance of OS, Introduction to DOS, UNIX, Linux, GUI windows and their important commands.

#### Section – B

**Elements of C:** C character set, identifiers and keywords, Data types: declaration and definition, storage classes in C, Type conversion, Types of error, 'C' macro, macro vs function.

**Operators:** Arithmetic, relational, logical, bitwise, unary, assignment and conditional operators and their hierarchy & associativity.

Data input/output.

#### Section – C

**Control statements:** Sequencing, Selection: if and switch statement; alternation, Repetition: for, while, and do-while loop; break, continue, goto.

**Functions:** Definition, prototypes, passing parameters, recursion.

**Data Structures:** arrays, struct, union, string, data files.

**Pointers:** Declaration, operations on pointers, array of pointers, pointers to arrays.

#### References:

- E. Balaguruswami, Programming in ANSI C, Tata Mcgraw Hill.
- R. B. Patel, Fundamental of Computers and Programming in C, Khanna Book Publishing Company PVT. LTD. Delhi, India, 1<sup>st</sup> edition, 2008, ISBN: 13: 978-81-906988-7-0, pp. 1-962.
- Yashwant Kanetker, Let us C, BPB Publications.
- Gottfried, Programming with C, Tata McGraw Hill.
- Brian W. Kernighan, Dennis M. Ritchie, The C Programming Language, 2<sup>nd</sup> Ed., Prentice Hall of India.
- P.K.Sinha, Priti Sinha, Computer Fundamentals, 3<sup>rd</sup> Ed., BPB Publications.

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- Kriti Basandra, Gagan Basandra, Computers Today, Galgotia Publications.
- S.S. Bhatia and Vikram Gupta, Computer Fundamentals, Kalayani Publication.

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#### MCA-103 Computer Organisation

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**Total Marks : 150**

**Theory Paper : 100**

**Internal Assessment : 50**

**Minimum Pass Marks : 40%**

**Maximum Time : 3 Hrs.**

#### Section – A

**Information Representation:** Number systems, BCD codes, error detecting and correcting codes. Binary arithmetic operations, Booths multiplication.

**Binary Logic:** Boolean algebra, Boolean functions, truth tables, canonical and standard forms, simplification of Boolean functions, digital logic gates. Encoders, decoders, multiplexers, demultiplexers and comparators.

#### Section – B

**Sequential Logic:** Flip-flops, shift registers and counters. RTL. Logic micro operations. Computer instructions. General register organization, RISC, CISC, Memory parameters, signal converters–Analog to Digital & vice-versa.

#### Section - C

**CPU organization:** Processor organization, instruction cycles, instruction formats and addressing modes, microprogramming concepts, micro program sequencer. **I/O Organization:** I/O interface, interrupt structure, transfer of information between CPU/memory and I/O devices, and IOPs.

#### References:

- Mano, M. Morris Digital Logic and Computer Design, Pearson Educations
- Mano, M. Morris Computer system Architecture, Pearson Educations
- Thomas C. Bartee, Digital Computer Fundamentals, 6/e, Tata McGraw-Hill Ed.
- Rajaraman, V., Radhakrishnan, T., An Introduction To Digital Computer Design, Prentice Hall of India Pvt. Ltd., 4th Ed.
- Malvino, Leach, Saha, Digital Principles and Applications, 6<sup>th</sup> Ed., The Mc-Graw Hill Companies, New Delhi.
- Hayes, J.P., Computer Architecture and Organization, McGraw Hill, 1998, Third Ed.

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### MCA-105 DISCRETE MATHEMATICAL STRUCTURES

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**Total Marks : 150**

**Theory Paper : 100**

**Internal Assessment : 50**

**Minimum Pass Marks : 40%**

**Maximum Time : 3 Hrs.**

#### Section – A

**Graphs:** Introduction to graphs, Graph terminology, Representing Graphs and Graph Isomorphism, Connectivity. Directed and undirected graphs and their matrix representations, reachability, Chains, Circuits, Eulers paths and cycles, Hamiltonian paths and cycles, Minima's Path Application (Flow charts and state transition Graphs, Algorithm for determining cycle and minimal paths), Trees, Binary trees, Binary search trees and traversals, Graph coloring.

#### Section – B

**Groups & Subgroups:** Group axioms, permutation groups, subgroups, cosets, normal subgroups, semi - groups, free semi – groups, applications.

**Finite Fields:** Definition, representation, structure, minimal polynomials, polynomial roots, Splitting Field, Integral Domain, Irreducible polynomial.

**Formal Languages:** Representation of special languages and grammars, finite state machines.

#### Section – C

**Lattices & Boolean Algebra:** Relation to partial ordering, lattices, Hasse Diagram, Axiomatic definition of Boolean algebra as algebraic structures with two operations basic results truth values and truth tables, the algebra of propositional functions, Boolean algebra of truth values, Applications (Switching Circuit, Gate Circuit).

#### References:

1. Kenneth G. Rosen: "Discrete Mathematics and Its Applications", McGRAW-Hill International Edition, Mathematics Series.
2. Babu Ram: "Discrete Mathematics and Its Applications", Vinayaka Publications.
3. C.L.Liu, "Discrete Mathematics and Its Applications", McGRAW-Hill International Edition, Mathematics Series.
4. Trembley, "Discrete Mathematics and Its Applications", Tata McGRAW-Hill.
5. Alan Doerr, Kenneth Levaseur, "Applied Discrete Structures for Computer Sciences", Galgotia Publications Pvt. Ltd.
6. Scymour Lipschutz, Marc Lars Lipson, "Discrete Mathematics", McGRAW-HILL International Editions, Schaum's Series.

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7. Bernard Kolman, Robert C. Busby, “Discrete Mathematical Structures for Computer Science”, Prentice Hall of India.

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### MCA-107 SOFTWARE ENGINEERING

**Note:** Total **8 Questions** are to be set by the examiner covering the entire syllabus uniformly. **Question No. 1 (COMPULSORY)** having **Objective Type Questions** of **2 marks** from entire syllabus. Rest of the **Seven** questions are from **Section A, B & C** of **Syllabus**. A candidate is required to attempt any **Four questions** out of Sections A, B & C by selecting **ATLEAST ONE** Question from Each Section. All questions shall carry equal marks.

**Total Marks : 150**

**Theory Paper : 100**

**Internal Assessment : 50**

**Minimum Pass Marks : 40%**

**Maximum Time : 3 Hrs.**

#### Section – A

**Introduction to Software Engineering:** Software crisis, Software engineering Approach and Challenges, Software development process models with comparison: Waterfall, Rapid prototyping, Timeboxing and Spiral Models, and Automation through software environments.

#### Section – B

**Planning the Software Project:** Cost Estimation, Planning Schedule, Staffing, Project Monitoring, Quality Assurance and Risk Management.

**Structured Analysis:** Initial Investigation, Feasibility study, Traditional and modern methods of requirement determination, SRS, Structuring the requirements: Process modeling, logic modeling, conceptual data modeling, Metrics. Validation VS verification

#### Section – C

**Design Fundamentals:** Function and Object Oriented Design concepts, Verification and Metrics.

**Coding and Maintenance:** Coding Process, Metrics, Testing fundamentals, Types of Testing, Metrics, Types of Maintenance.

**Software Re-Engineering:** Source Code Translation, Program Restructuring, Data Re-Engineering, Reverse Engineering.

#### References:

- Sommerville Ian, Software Engineering, 5th ed., Addison Wesley-2000
- Hoffer, George, Valacich, Modern System Analysis and Design 3<sup>rd</sup> Ed. Pearson Education
- Pressman S. Roger, Software Engineering, Tata McGraw-Hill.
- Jalote Pankaj, An integrated Approach to Software, Engineering, Narosa Publishing House

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### MCA-109 OPTIMIZATION TECHNIQUES AND STATISTICAL METHODS USING C

**Note:** Total **8 Questions** are to be set by the examiner covering the entire syllabus uniformly. **Question No. 1 (COMPULSORY)** having **Objective Type Questions** of **2 marks** from entire syllabus. Rest of the **Seven** questions are from **Section A, B & C** of **Syllabus**. A candidate is required to attempt any **Four questions** out of Sections A, B & C by selecting **ATLEAST ONE** Question from Each Section. All questions shall carry equal marks.

**Total Marks : 150**

**Theory Paper : 100**

**Internal Assessment : 50**

**Minimum Pass Marks : 40%**

**Maximum Time : 3 Hrs.**

#### Section –A

**Introduction:** Nature, Meaning and Applications of Operations research. Modeling, It's Principal and Approximation of O.R. Models, Main characteristic and phases, General Methods of solving models, Scientific Methods, Scope.

**Linear Programming:** Formulation, Graphical solution, standard and matrix forms of linear programming problems, Simplex method and its flow chart, Two phase Simplex method, Degeneracy.

#### Section – B

**Duality:** Introduction, Definition, General Rule for converting any primal into its Dual, Dual Simplex method and its flow chart.

**Integer Programming:** Importance and Applications, Gomory's all integer programming problem technique, Branch and Bound Method.

**PERT and CPM:** Basic steps in PERT and CPM, Forward and Backward computation, Representation in Tabular form, Slack and Critical path, Difference between CPM and PERT, Float.

#### Section – C

**Statistical methods:** Sample distributions, Test of Significance, chi-square, t and F test.

**Analysis of Variance:** Definition, Assumptions, Cochran's Theorem, One-way classification, ANOVA Table, Two-way classification (with one observation per cell).

**Time Series Analysis:** Components and Analysis of Time Series, Measurement of Trend, Seasonal fluctuations and Cyclic movement.

#### References:

- Kasana H.S., "Optimization techniques, Springer Verlag.
- Sharma, S.D., Operations Research, Kedar Nath & Ram Nath, Meerut, 1996.
- Gupta S.C, Kapoor V.K, Fundamentals of Mathematical Statistics, Sultan Chand & Sons, New Delhi, 1994.
- Gupta P.K, Hira and D.S., Operation Research, Sultan Chand & Sons, New Delhi, 1994.
- Kanti Swarup, Gupta P.K. & Man Mohan, Operation Research, Sultan Chand & sons, New Delhi, 1990.
- Rao S.S., Optimization Theory and Applications, Wiley Eastern Ltd. New Delhi, 1991.

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- J.C. Pant, Introduction to Optimization techniques: Operation Research, Jain brothers Publication, N. Delhi
- Taha, H.A., Operation Research - An Introduction, McMillan Publishing Co, New York, 1986.

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### MCA – 2<sup>nd</sup> Semester

Sr. No.	Paper Code	Title of Paper	L	T	P	Sessional	Theory	Practical	Total	Credit
1.	MCA-102	Introduction to Internet & Web Designing	3	1	-	50	100	-	150	4
2.	MCA-104	Data Structures	3	1	-	50	100	-	150	4
3.	MCA-106	Computer Networks	3	1	-	50	100	-	150	4
4.	MCA-108	System Simulation	3	1	-	50	100	-	150	4
5.	MCA-110	Object Oriented Systems and C ++	3	1	-	50	100	-	150	4
6.	MCA-124	Software Lab.-III, C (Based on MCA-202)	-	-	3x 2	50	-	50	100	3
7.	MCA-130	Software Lab.-IV, C++ (Based on MCA-205)	-	-	3x 2	50	-	50	100	3
8.	MCA-132	Seminar	-	-	-	100	-	-	100	1
		<b>Total</b>	<b>15</b>	<b>5</b>	<b>12</b>	<b>450</b>	<b>500</b>	<b>100</b>	<b>1050</b>	<b>27</b>

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#### MCA – 102 Introduction to Internet and Web Designing

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**Total Marks : 150**

**Theory Paper : 100**

**Internal Assessment : 50**

**Minimum Pass Marks : 40%**

**Maximum Time : 3 Hrs.**

#### Section-A

**Internet Basics:** Concept of Internet, evolution, Specification and establishment details. Modems: Types, functions, IP addressing, Internet domains, DNS, ISP, Intranets and extranets. Internet Connectivity: Telephone line, cable, leased line, ISDN, VSAT, RF link. Internet Applications: E-mail, Telnet, FTP, Video conferencing.

#### Section-B

**World Wide Web:** Concepts, Web page: static, Dynamic, Active. Scripting languages: Server side, Client Side. Web site development Phases, Web: Designing, Development and Publishing, HTTP, URL registration, browsers, search engines, Web server, Proxy servers.

#### Section-C

**HTML:** Concepts, Structure of HTML documents, HTML Elements - Core attributes, Language attributes, Core Events, Block Level Events. Text Level Events, Linking Basics, Linking in HTML, Images and Anchors, Anchor Attributes, Image Maps, Semantic Linking Meta Information, Image Preliminaries, Image Download issues, Images as Buttons, Introduction to Layout: Backgrounds, Colors and Text, Fonts, Layout with Tables, Advanced Layout : Frames and layers, Style Sheets, Positioning with Style sheets, Forms, Forms Control, New and emerging Form Elements.

Front Page Web Tool: Front page editor, Front page explorer

#### References:

- Using the Internet, Honey Cutt, 4<sup>th</sup> ed., PHI.
- World Wide Web Design with HTML, Xavier, TMH
- The complete reference – Front page, TMH
- Tech yourself the Internet in 24 Hrs, SAMS
- Thomas A. Powell, The complete reference HTML & XHTML, Fourth Edition, Tata mcgraw Hill, New Delhi (2003)

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#### MCA-104 DATA STRUCTURES USING C

**Note:** Total **8 Questions** are to be set by the examiner covering the entire syllabus uniformly. **Question No. 1 (COMPULSORY)** having **Objective Type Questions** of **2 marks** from entire syllabus. Rest of the **Seven** questions are from **Section A, B & C** of **Syllabus**. A candidate is required to attempt any **Four questions** out of Sections A, B & C by selecting **ATLEAST ONE** Question from Each Section. All questions shall carry equal marks.

**Total Marks : 150**

**Theory Paper : 100**

**Internal Assessment : 50**

**Minimum Pass Marks : 40%**

**Maximum Time : 3 Hrs.**

#### Section – A

Introduction to Data Structures, Primitive and Composite, Arrays, Matrices, Sparse Matrices, String representation and manipulation.

#### Section B

Stacks: Concepts, Operations and representation in C, Application to evaluation of postfix expression, Conversion from infix to postfix representation.

Queue: Sequential representation, operations, priority queues and array implementation. Dequeue,

Linked lists: concepts, operation, stack and queues as lists, array and dynamic representation, circular lists, doubly linked list, josephus problems

Trees, Binary trees, Threaded Binary tree, Balanced tree, Different tree traversal algorithms.

#### Section C

Representation of Graphs and Applications, various searching and sorting techniques, Hashing, Dynamic Memory Management.

#### References:

- Bandyopadhyay, Data Structure using C, Pearson Education
- Salaria R.S., Data Structure and algorithm using C, Khanna Publications
- Yedidyah Langsam, Moshe J Augernstein and Aarson M.Tanenbaum, Data Structures using C and C ++, PHI, New Delhi (1997)
- R. B. Patel, Expert Data Structures With C, Khanna Publications, Delhi, India, 3<sup>rd</sup> Edition 2008, ISBN 81-87522-41-0, pp. 1-950.
- Trembley, J.P. and Sorenson P.G., An Introduction to Data Structures with Applications, McGraw-Hill International Student Edition, New York(1984)
- Seymour Lipschutz, Data Structures, McGraw-Hill Book Company, Schaum's Outline Series, New York(1986).

## Regular Course (Scheme and Syllabus)

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### MCA-106 COMPUTER NETWORKS

**Note:** Total **8 Questions** are to be set by the examiner covering the entire syllabus uniformly. **Question No. 1 (COMPULSORY)** having **Objective Type Questions** of **2 marks** from entire syllabus. Rest of the **Seven** questions are from **Section A, B & C** of **Syllabus**. A candidate is required to attempt any **Four questions** out of Sections A, B & C by selecting **ATLEAST ONE** Question from Each Section. All questions shall carry equal marks.

**Total Marks : 150**

**Theory Paper : 100**

**Internal Assessment : 50**

**Minimum Pass Marks : 40%**

**Maximum Time : 3 Hrs.**

#### Section - A

**Network Concepts:** Goals and applications of Computer Networks; Topologies; Categories of Networks - LAN, MAN, WAN, point-to-point and broadcast networks; Introduction to SMDS, X.25 Networks, ISDN, frame relay and ATM networks.

**Network Architecture:** Concept of protocols & services; OSI model and functions of its layers; TCP/IP reference model.

**Data communication concepts:** Components of a data communication system; transmission modes; transmission media - guided and wireless media; introduction to switching (circuit, message and packet) and multiplexing (frequency division and time division); concept of Modems.

#### Section - B

**Framing and Error control:** Framing techniques; Error control-error detection & correction.

**Data Link Control:** Acknowledgments; Sliding Window protocols.

Medium Access Control and LANs : Multiple Access protocols of MAC sub layer - ALOHA, 1-persistent, p-persistent and non-persistent CSMA, CSMA/CD, Collision free protocols, Limited contention protocols, Wavelength Division Multiple Access, MACA, GSM, CDPD, CDMA; IEEE Standard 802 for LANs and MANs- Ethernet, token bus, token ring, DQDB.

#### Section - C

**Routing:** Deterministic and Adaptive routing; Centralized and distributed routing; shortest-path; flooding; flow based; optimal; distance vector, link-state, hierarchical; routing for mobile hosts; broadcast and multicast routing;

**Congestion control:** Principles of congestion control; Traffic shaping; choke packets; load shedding; RSVP.

**Transmission control protocol (TCP);** user datagram protocol (UDP); Internet protocol (IP).

#### References:

- Computer Networks - Andrew s. Tanenbaum, Pearson Educations.
- Introduction to Data communications and Networking- Behrouz, Forouzan, Tata Mc-Graw Hill.
- Data and Computer Communications, William Stallings, Pearson education

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- Data Communications, Computer Networks and Open Systems, fourth edition-Fred Halsall, Addison Wesley.
- Distributed Computing, Mahjan & Shah, Oxford Press New Delhi

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Faculty of Information Technology and Computer Science

Deenbandhu Chhotu Ram University of Science & Technology, Murthal (Sonapat),  
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### MCA-108 SYSTEM SIMULATION

**Note:** Total **8 Questions** are to be set by the examiner covering the entire syllabus uniformly. **Question No. 1 (COMPULSORY)** having **Objective Type Questions** of **2 marks** from entire syllabus. Rest of the **Seven** questions are from **Section A, B & C** of **Syllabus**. A candidate is required to attempt any **Four questions** out of Sections A, B & C by selecting **ATLEAST ONE** Question from Each Section. All questions shall carry equal marks.

**Total Marks : 150**

**Theory Paper : 100**

**Internal Assessment : 50**

**Minimum Pass Marks : 40%**

**Maximum Time : 3 Hrs.**

#### Section - A

**INTRODUCTION:** Concept of System, stochastic activities, continuous and discrete systems, system modeling, principals used in modeling.

**Simulation of System:** Concepts of simulation of continuous system with the help of examples; use of integration formulas; concepts of discrete system simulation with the help of examples. Generation of random numbers, Generation of non-uniformly distributed random numbers.

#### Section - B

**Simulation of Queuing Systems:** Basic concepts of queuing theory, Simulation of single - server, two-server and general queuing systems.

**Simulation in inventory control and forecasting:** Elements of inventory theory, inventory models, Generation of Poisson and Erlang variates, forecasting and aggression analysis.

#### Section - C

**Design and evaluation of simulation experiments:** Experiment layout and Validation.

**Simulation Languages:** Continuous and discrete simulation languages, Block-Structured continuous simulation languages, Expression based languages, Discrete system simulation languages: GPSS, SIMSCRIPT, SIMULA, Factors in selection of discrete system simulation languages.

#### References:

- Narsingh Deo : "System Simulation with Digital Computer", PHI, New Delhi, 1993
- Gordon G.:"System Simulation", Prentice-Hall of India Pvt. Ltd. New Delhi-1993
- Payne, James A.: Introduction to Simulation: Programming Techniques and Methods of Analysis. McGraw-Hill International Editions, Computer Science Series, New York(1998).

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Faculty of Information Technology and Computer Science

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### MCA-110 OBJECT ORIENTED SYSTEMS AND C++

**Note:** Total **8 Questions** are to be set by the examiner covering the entire syllabus uniformly. **Question No. 1 (COMPULSORY)** having **Objective Type Questions** of **2 marks** from entire syllabus. Rest of the **Seven** questions are from **Section A, B & C** of **Syllabus**. A candidate is required to attempt any **Four questions** out of Sections A, B & C by selecting **ATLEAST ONE** Question from Each Section. All questions shall carry equal marks.

**Total Marks : 150**  
**Theory Paper : 100**  
**Internal Assessment : 50**

**Minimum Pass Marks : 40%**  
**Maximum Time : 3 Hrs.**

#### Section – A

**Object-Oriented Concepts:** Data abstraction, encapsulation, Classes and objects, modularity, hierarchy, typing, concurrency, persistence.

**Object-Oriented Methodology:** Advantages and disadvantages of OO methodologies. Modeling, Domain analysis. OMT Methodology-Object Model, links and associations, multiplicity, link attributes, role names, ordering qualification, aggregation, generalization and inheritance, abstract class, meta data, object diagram.

#### Section-B

Dynamic Model-events, states, scenarios, event traces, state diagram. Functional Model-data flow diagrams. Analysis, System design and Object design.

Data Types, structs vs. classes, static data & member function, constant parameters & member functions, friend functions & friend classes,

#### Section-C

Role of constructors & destructors, dynamic objects, operator overloading, function overloading, inheritance, virtual functions, abstract class, virtual class, template functions & template classes, exception handling, file stream classes, ASCII & Binary files, sequential & random access to a file.

#### References:

- Balaguruswami, E., Object Oriented Programming with C++, Tata McGraw-Hill, 1998
- R.S. Salaria Object Oriented Programming In C+, Khanna Publications
- Robertb Lafore , Object Oriented Programming with turbo C, Galgotia publication
- Rumbaugh, J. et. al., Object-Oriented Modeling and Design, Prentice Hall of India, 1998
- Booch, Grady, Object Oriented Analysis & Design, Addison Wesley, 1994

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Haryana, India

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- Stroustrup, B., The C++ Programming Language, Addison-Wesley, 1993
- Lippman, C++ Primer, 3/e, Addison-Wesley
- Schildt, Herbert, C++ : The Complete Reference, 2/e, Tata McGraw-Hill, 1998

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### MCA – 3<sup>rd</sup> Semester

Sr. No.	Paper Code	Title of Paper	L	T	P	Sessional	Theory	Practical	Total	Credit
1.	MCA-201	Data Base Management Systems	3	1	-	50	100	-	150	4
2.	MCA-203	Visual Programming using VB	3	1	-	50	100	-	150	4
3.	MCA-205	Operating Systems	3	1	-	50	100	-	150	4
4.	MCA-207	Advance Computer Architecture	3	1	-	50	100	-	150	4
5.	MCA-209	Managerial Information Systems	3	1	-	50	100	-	150	4
6.	MCA-221	Software Lab.-V, (Based on MCA-301 & MCA-302)	-	-	3x 2	50	-	50	100	3
7.	MCA-223	Minor Project ( Based on MCA-301 and MCA-302)	-	-	3x 2	50	-	50	100	3
8.	MCA-231	Seminar	-	-	-	100	-	-	100	1
		<b>Total</b>	<b>15</b>	<b>5</b>	<b>12</b>	<b>450</b>	<b>500</b>	<b>100</b>	<b>1050</b>	<b>27</b>

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### MCA - 201 Data Base Management Systems

**Note:** Total **8 Questions** are to be set by the examiner covering the entire syllabus uniformly. **Question No. 1 (COMPULSORY)** having **Objective Type Questions** of **2 marks** from entire syllabus. Rest of the **Seven** questions are from **Section A, B & C** of **Syllabus**. A candidate is required to attempt any **Four questions** out of Sections A, B & C by selecting **ATLEAST ONE** Question from Each Section. All questions shall carry equal marks.

**Total Marks : 150**

**Theory Paper : 100**

**Internal Assessment : 50**

**Minimum Pass Marks : 40%**

**Maximum Time : 3 Hrs.**

#### SECTION - A

**Basic Concepts and Conceptual Database Design:** Database administrator & Database Users, Characteristics of the Database, Database Systems, Concepts and Architecture, Data Models, Schemes & Instances, DBMS Architecture & Data Independence, Database Languages & Interfaces, Data Base Models, Data Modeling Using The Entity-Relationship Model—Entities, Attributes and Relationships, Strong and Weak Entity Sets, Generalization, Specialization, and Aggregation, Translating your ER Model into Relational Model

#### SECTION – B

**Relational Model:** Concepts, Languages & Systems, Relational Algebra, Constraints, **Relational Data Base Design and Architecture:** Functional Dependencies & Normalization for Relational Databases, Functional Dependencies, Normal Forms Based on Primary Keys, (1NF, 2NF, 3NF & BCNF), Lossless Join and Dependency Preserving Decomposition.

**SQL—A Relational Database Language,** Data Definition in SQL, View and Queries in SQL, Specifying Constraints and Indexes in SQL.

#### SECTION – C

**Transaction Management:** Transaction Concept and State, Implementation of Atomicity and Durability, Concurrent Executions, Serializability, Recoverability, Implementation of Isolation, **Concurrency Control Techniques,** Lock-Based Protocols, Timestamp-based Protocols, Validation – based Protocols, Multiple Granularity, Multiversion Schemes, Deadlock Handling, **Recovery System,** Failure Classification, Storage Structure, Recovery and Atomicity, Log-based Recovery, Shadow Paging, Recovery with Concurrent Transactions, Buffer Management, Failure with Loss of Nonvolatile Storage.

**Query Processing:** Query Processing, Overview, Measures of Query Cost, Selection Operation, Sorting, Join.

#### *References:*

- Elmasri & Navathe: Fundamentals of Database systems, 4th Ed., A. Wesley, 2004
- Korth, Silberschatz, “Database System Concepts”, 4th Ed., TMH, 2000.
- Steve Bobrowski, “Oracle 8 Architecture”, TMH, 2000
- Date C. J., “An Introduction to Database Systems”, 7th Ed., Narosa Publishing, 2004

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- S. K Singh, “Data Base systems: Concept Design and Applications, Pearson Ed.
- Ullman J. D., “Principles of Database Systems”, 2nd Ed., Galgotia Publications, 1999.

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### MCA - 203 Visual Programming using Visual Basic

**Note:** Total **8 Questions** are to be set by the examiner covering the entire syllabus uniformly. **Question No. 1 (COMPULSORY)** having **Objective Type Questions** of **2 marks** from entire syllabus. Rest of the **Seven** questions are from **Section A, B & C** of **Syllabus**. A candidate is required to attempt any **Four questions** out of Sections A, B & C by selecting **ATLEAST ONE** Question from Each Section. All questions shall carry equal marks.

**Total Marks : 150**

**Theory Paper : 100**

**Internal Assessment : 50**

**Minimum Pass Marks : 40%**

**Maximum Time : 3 Hrs.**

#### SECTION - A

**Concepts of Object based Event Oriented Languages:** Method, Statement, Properties and Event; Developing VB Project/ Application; Design the User Interface; User Input Event Handling; Comparison of Visuals and Non-Visuals Architectures.

**The VB Integrated Development Environment:** Menu Bar, Context Menus, Tool Bar, Project Explorer, Tool Box, Properties Window; Form Designer, Immediate window; Object Browser; Code Editor Window; Form Layout Window; Locals, and Watch Windows, Customizing the Environment

**The VB language and its elements:** Variables, Constants, Arrays, Collections, Subroutines, Functions, Arguments, and Control Structures

#### SECTION – B

**Designing and Coding a VB Application:** Working with VB Forms, Form Properties; Building Dynamic Forms, Design a VB Form using Default Controls, Event Procedures.

Drag and Drop Operations, Menus and Toolbar designing, dynamic menu appearance; Dialog Box: Working with Built-in Dialog Boxes, User Defined Dialog Boxes, and Common Dialogs Control

Multiple Document Interface (MDI), Object Linking and Embedding (OLE), Error handling in VB - Types of Errors, Error handling methods and functions, Graphics with Visual Basic; Working with files, Object Oriented programming with VB.

#### SECTION – C

**VB Program Components:** Common Controls and their properties, working with Control Arrays, Building ActiveX Components, ActiveX Controls, ActiveX Documents; Working with Dynamic Link Libraries (DLL).

**Visual Basic and Database Programming:** Database Models Visual data manager, Data Control - methods, properties, connectivity with database, Data-Bound controls; Working With Remote Data Object (RDO), ActiveX Data Object (ADO) data control, Attaching Queries with database; Data Report Designer.

**Overview of COM/DCOM,** using Windows API Functions, MAPI interface, Microsoft Transaction Server, Visual Source Safe, working with the packaging and Deployment Wizard

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#### **References:**

- Visual Basic 6 Programming, Black Book, by Steven Holzer, Dreamtech Press.
- Special Edition Using Visual Basic 6.0 by Brian Siler and Jeff Spotts, PHI
- Mastering Visual Basic -6 by Evangelos Petroustos, BPB
- Programming in Visual Basic - 6 by J C Bradley, A.C. Millspaugh, TMH
- VB-6 The Complete Reference by Jerke, TMH
- Visual Basic – 6 by Howard Hawee, PHI
- Peter Norton's Guide to Visual Basic 6.0 by Peter Norton
- Visual Basic 6 Super Bible by David Jung, TechMedia Publications

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### MCA 205 OPERATING SYSTEMS

**Note:** Total **8 Questions** are to be set by the examiner covering the entire syllabus uniformly. **Question No. 1 (COMPULSORY)** having **Objective Type Questions** of **2 marks** from entire syllabus. Rest of the **Seven** questions are from **Section A, B & C** of **Syllabus**. A candidate is required to attempt any **Four questions** out of Sections A, B & C by selecting **ATLEAST ONE** Question from Each Section. All questions shall carry equal marks.

**Total Marks : 150**  
**Theory Paper : 100**  
**Internal Assessment : 50**

**Minimum Pass Marks : 40%**  
**Maximum Time : 3 Hrs.**

#### SECTION A

**Introduction to Operating System:** Definition, Batch Processing System, Multiprogramming Systems, Time Sharing Systems, Parallel Systems, Distributed Systems, Real Time Systems, Modern Operating Systems, Operating System Services.

**Processes and Threads:** Processes and Programs, Programmer view of Processes, OS View of Processes, Threads, Case Studies of Processes and Threads.

**Scheduling:** Basic Scheduling Concepts, Non-Preemptive Scheduling Policies, Preemptive Scheduling Policies, Process States, Multiprogramming, Schedulers (Short Term, Mid Term, Long Term), Real Time Scheduling, Scheduling in Unix/Linux/Windows.

#### SECTION B

**Deadlocks:** Definition, Deadlocks in Resource Allocation, Handling Deadlocks, Deadlock Detection and Resolution, Deadlock Prevention, Deadlock Avoidance, Deadlock Handling in Practice.

**Memory Management:** Managing the Memory Hierarchy, Introduction, Contiguous Memory Allocation, Non-Contiguous Allocation, Kernel Memory Allocation, Fixed Partitioned Memory Management, Variable Partitions, Paging, Segmentation, Segmentation with Paging.

**Virtual memory management:** Virtual Memory Basics, Demand Paging, Page Replacement Policies, Allocation of Frames, Shared Pages, Unix Virtual Memory, Linux Virtual Memory, Virtual Memory Using Segmentation.

#### SECTION C

**File Systems:** File Supports, Access Methods, Allocation Methods-Contiguous, Linked and Index Allocation; Directory Systems-Single Level, Tree-Structured, a Cyclic Graph and General Graph Directory, File Protection.

**Secondary-Storage Structure:** Disk Structure, Disk Scheduling, Disk Management, Swap-Space Management.

**Process Synchronization:** Data Access Synchronization and Control Synchronization, Race Condition in Control Synchronization, Critical Sections, Semaphores; Classical Problems of Synchronization: Bounded Buffer, Reader Writer and Dining Philosophers.

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Haryana, India

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#### **References:**

- Operating System Principles- Abraham Silberchatz, Peter B. Galvin, Greg Gagne 7<sup>th</sup> Edition, John Wiley
- Operating Systems – Internals and Design Principles Stallings, Fifth Edition–2005, Pearson Education/PHI
- Madnick E., Donovan J., “Operating Systems”, Tata McGraw Hill, 2001
- Operating System A Design Approach-Crowley, TMH.
- Modern Operating Systems, Andrew S Tanenbaum 2nd edition Pearson/PHI
- Operating Systems - A Concept- Based Approach, D M Dhamdhere, 2<sup>nd</sup> Edition, TMH

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#### MCA-207      **ADVANCED COMPUTER ARCHITECTURE**

**Note:** Total **8 Questions** are to be set by the examiner covering the entire syllabus uniformly. **Question No. 1 (COMPULSORY)** having **Objective Type Questions** of **2 marks** from entire syllabus. Rest of the **Seven** questions are from **Section A, B & C** of **Syllabus**. A candidate is required to attempt any **Four questions** out of Sections A, B & C by selecting **ATLEAST ONE** Question from Each Section. All questions shall carry equal marks.

**Total Marks : 150**  
**Theory Paper : 100**  
**Internal Assessment : 50**

**Minimum Pass Marks : 40%**  
**Maximum Time : 3 Hrs.**

#### **Section – A**

**Parallel Computer Fundamentals:** The state of computing, computation models, Concurrent and parallel execution, Classifications of parallel architectures, parallel techniques, relationships between languages & parallel architectures.

**Instruction-Level-Parallel Processors:** Parallelism: Hardware & software parallelism, Dependencies between instruction, Program partitioning and scheduling, Grain size and latency, Program flow mechanisms, Control flow vs. data flow, Data flow architecture, Demand driven mechanisms.

#### **Section – B**

**Pipelining Processing:** Principles of pipelining, Pipelined instruction processing. Synchronous & asynchronous pipeline. Linear Pipeline processor, Nonlinear pipeline processor, Dynamic instruction scheduling, Superscalar processors and its architectures, Branch handling-delayed branching, branch processing, VLIW architectures.

#### **Section – C**

**Memory Hierarchy Technology:** Memory Hierarchy, Inclusion, Coherence and Locality, Cache addressing models, Direct mapping and associative caches, Interleaved memory organization.

**Shared-Memory MIMD architectures:** Multiprocessors and multicomputers, Multivector Computers, Static & Dynamic interconnection networks, Switching networks-hierarchical, crossbar & multistage networks. Cache coherence problem, Hardware based cache coherence protocol-Snoopy cache protocol, Directory scheme, Hierarchical cache coherence protocol. UMA, NUMA, CC-NUMA and COMA multiprocessors.

#### **References:**

- Sima, D. et al., Advanced Computer Architecture, Addison Wesley, 2000
- Hwang, Kai, Advanced Computer Architecture, McGraw Hill, International Ed.
- Hwang Kai, Briggs Faye A., Computer Architecture and Parallel Processing, McGraw Hill, International Ed.
- Hayes P. John, Kain, Computer Architecture and Organization, 3/e, McGraw Hill, International Ed.

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#### MCA – 209 Managerial Information System

**Note:** Total **8 Questions** are to be set by the examiner covering the entire syllabus uniformly. **Question No. 1 (COMPULSORY)** having **Objective Type Questions** of **2 marks** from entire syllabus. Rest of the **Seven** questions are from **Section A, B & C** of **Syllabus**. A candidate is required to attempt any **Four questions** out of Sections A, B & C by selecting **ATLEAST ONE** Question from Each Section. All questions shall carry equal marks.

**Total Marks : 150**

**Theory Paper : 100**

**Internal Assessment : 50**

**Minimum Pass Marks : 40%**

**Maximum Time : 3 Hrs.**

#### SECTION - A

**System:** Introduction to systems, concepts of system, elements of systems, System types, Information System Definitions and characteristics, **Information:** Types of Information, Information quality, dimensions of information, Role of information in decision, Management levels, **MIS:** Definition of MIS, nature and scope of MIS, MIS characteristics and functions Importance's of MIS, Concepts of Management, information system.

#### SECTION - B

**Developing Information System:** Analysis and Design of information system, Structure and classification of MIS: structure of MIS, MIS classification, Robert Anthony's Hierarchy of Management activity, Implementation and pitfalls in MIS development. Introduction to DSS, Characteristics and objectives of decision making, DSS architecture, DSS v/s MIS, Programmed v/s nonprogrammer decisions, Simon's Model of decision making, types of decisions, purpose of decision making.

#### SECTION - C

**Decision Models:** Decision under assumed certainty, risk and uncertainty, Quantitative tools for decision making, Kepner Tregoe Method, Decision Generator, DSS tools and their relationship, decision making and MIS, Examples of different types of DSS (such as Executive Support System, E-Governance, Components of DSS, GDSS, Expert System, Pros and cons of Expert system, Knowledge system.

#### References:

- Lucas, "Information Techniques: Strategic Decision Making for managers", Wiley India.
- Turban, "Information Technology for management", 4<sup>th</sup> ed, Wiley India.
- Robert G. Murdick & Joel E. Ross & James R. Claggett, "Information Systems for Modern Management" PHI.
- Turban, "Decision Support System & Intelligent System", 7<sup>th</sup> ed, Pearson.
- Efreem G. Mallach, "Decision and data warehouse System", Tata Mcgraw hill.

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#### MCA – 4<sup>th</sup> Semester

Sr. No.	Paper Code	Title of Paper	L	T	P	Sessional	Theory	Practical	Total	Credit
1.	MCA-202	Computer Graphics & Multimedia	3	1	-	50	100	-	150	4
2.	MCA-204	JAVA Programming	3	1	-	50	100	-	150	4
3.	MCA-206	Data Warehousing and Mining	3	1	-	50	100	-	150	4
4.	MCA-208	Elective – I	3	1	-	50	100	-	150	4
5.	MCA-210	Elective – II	3	1	-	50	100	-	150	4
6.	MCA-222	Software Lab.-VI, C (Based on MCA-401)	-	-	3x 2	50	-	50	100	3
7.	MCA-224	Software Lab.-VII, JAVA (Based on MCA-402)	-	-	3x 2	50	-	50	100	3
8.	MCA-232	Seminar	-	-	-	100	-	-	100	1
		<b>Total</b>	<b>15</b>	<b>5</b>	<b>12</b>	<b>450</b>	<b>500</b>	<b>100</b>	<b>1050</b>	<b>27</b>

#### Electives I

MCA-208(A)-Information Security

MCA-208(B)-E- Commerce

MCA-208(C)-Linux and Shell Programming

MCA-208(D)-Software Quality Assurance and Testing

MCA-208(E)-Design and Analysis of Algorithm

#### Electives II

MCA-210(A)-Internet and Intranet Engineering

MCA-210(B)-Distributed Operating Systems

MCA-210(C)-Principles of Programming Language

MCA-210(D)-Network Management and Programming

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#### MCA-202 COMPUTER GRAPHICS AND MULTIMEDIA

**Note:** Total **8 Questions** are to be set by the examiner covering the entire syllabus uniformly. **Question No. 1 (COMPULSORY)** having **Objective Type Questions** of **2 marks** from entire syllabus. Rest of the **Seven** questions are from **Section A, B & C** of **Syllabus**. A candidate is required to attempt any **Four questions** out of Sections A, B & C by selecting **ATLEAST ONE** Question from Each Section. All questions shall carry equal marks.

**Total Marks : 150**

**Theory Paper : 100**

**Internal Assessment : 50**

**Minimum Pass Marks : 40%**

**Maximum Time : 3 Hrs.**

#### SECTION - A

**Introduction:** Introduction to computer graphics, image processing and its applications; Interactive and passive graphics; Introduction to GKS primitives; display processors;

**Graphic Devices:** Display systems-refresh CRTs, raster scan and random scan, Interlacing, beam penetration shadow mask monitors, look up tables, plasma panel, LED and LCD monitors, VGA and SVGA resolutions; Hard copy Devices-printers, plotters; Interactive Input Devices-mouse, digitizing tablet, light pen, touch panels, image scanners, voice systems, joy stick, track ball.

**Drawing Geometry:** Coordinate system; resolution; use of homogeneous coordinate system; scan conversions: Scan converting lines, rectangles, circles, ellipses, DDA algorithm, Bresenham's algorithm for line and circle.

#### SECTION - B

**2-D Transformations:** Translation; rotation; scaling; mirror reflection; shearing; zooming; panning; input techniques-pointing, positioning, rubber band methods and dragging; tweening.

**Graphic operations:** Clipping-line clipping using Sutherland-Cohen and midpoint sub-division algorithm, circle clipping, polygon clipping; window and viewport; windowing transformation; Filling-stack based fill algorithm, scan-line seed fill algorithm;

#### SECTION - C

**3-D Graphics:** 3D modelling of objects; 3D display techniques; coordinate system; 3D transformation matrices for translation, scaling and rotation; parallel projection; perspective projection; Hidden-surface removal- Z-buffer, back face, scan-line, depth-sorting, area subdivision; Shading-modelling light intensities, gouraud shading, phong shading.

**Multimedia:** Concepts of Hypertext/Hypermedia; multimedia applications; multimedia authoring; multimedia hardware; images; bitmaps; windows paint brush.

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Haryana, India

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#### **References:**

- D. Hearn and P. Baker, "Computer Graphics", Prentice Hall.
- Newman & Sproull, "Principles of Interactive Computer Graphics", McGraw Hill.
- John F. Koegel Buford, "Multimedia Systems - Addison Wesley
- Foley et. al., "Computer Graphics Principles & practice", AWL.
- David F. Rogers, "Procedural Elements for Computer Graphics", McGraw Hill Book Company, 1985
- D.P. Mukherjee, "Fundamentals of Computer Graphics and Multimedia", PHI.

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#### MCA-204: Java Programming

**Note:** Total **8 Questions** are to be set by the examiner covering the entire syllabus uniformly. **Question No. 1 (COMPULSORY)** having **Objective Type Questions** of **2 marks** from entire syllabus. Rest of the **Seven** questions are from **Section A, B & C** of **Syllabus**. A candidate is required to attempt any **Four questions** out of Sections A, B & C by selecting **ATLEAST ONE** Question from Each Section. All questions shall carry equal marks.

**Total Marks : 150**

**Theory Paper : 100**

**Internal Assessment : 50**

**Minimum Pass Marks : 40%**

**Maximum Time : 3 Hrs.**

#### SECTION - A

**Introduction to Java:** History and Features of java language, java v/s C/C++, Java and internet, Java development kit, Java Virtual Machine, Java API, Java program structure, Running java application and applets, Command line arguments.

**Java Programming:** Data types, operators and expressions, formatted output, control statements, classes, objects and methods, constructors, method overloading, access qualifiers, Wrapper classes, array, String class and its methods, StringBuffer, StringTokenizer, inheritance, using super, method overriding, final, packages and interface.

#### SECTION – B

**Multithreading:** Process v/s Thread, Thread class and methods, Life cycle of a thread, creating and manipulating threads, Thread priority, synchronization, implementing Runnable interface.

**Applet Programming:** Introduction to Applets, Life cycle of applets, Applet Tag, executing applets in a web page, passing parameters to applet.

**Exception Handling:** Exception types, using try, catch and finally, multiple catch clauses, nested try statements, throw and throws, user defined exceptions.

#### SECTION - C

**Java Input/Output:** I/O basics, byte and characters streams, working with FileInputStream, FileOutputStream, PrintStream, RandomAccessFile, FileReader, FileWriter, BufferedReader, BufferedWriter, PrintWriter, StreamTokenizer, regular expression processing, serialization, ObjectOutputStream, ObjectInputStream.

**Event Handling:** Delegation Event Model, Event classes and event listener interfaces, handling mouse and keyboard events, Adapter classes, inner classes

**Graphics Programming:** AWT classes, working with Frame window, Graphics class, awt controls, layout managers, menu, dialog boxes.

#### References

- H.M. Deitel, P.J. Deitel, Java How to Program, sixth edition, Pearson Education.
- Herbert Schildt, The Complete Reference Java 2, fifth edition, Tata McGrawHill.
- E. Balaguruswami, Programming with Java, second edition, Tata McGrawHill.

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Haryana, India

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- Mughal K.A., Rasmussen R.W., A Programmer's Guide to Java Certification, Addison- Wesley, 2000.
- Cay S. Horstmann, Gray Cornell, Core Java 2 Volume I-Fundamentals and Volume II-Advanced Features, Sun Microsystems Press, Pearson Education.
- David Flanagan, Java in a Nutshell, fourth edition, O'Reilly
- Jonni Kanerva, The Java FAQ, Pearson Education

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### MCA-206 DATA WAREHOUSING AND MINING

**Note:** Total **8 Questions** are to be set by the examiner covering the entire syllabus uniformly. **Question No. 1 (COMPULSORY)** having **Objective Type Questions** of **2 marks** from entire syllabus. Rest of the **Seven** questions are from **Section A, B & C** of **Syllabus**. A candidate is required to attempt any **Four questions** out of Sections A, B & C by selecting **ATLEAST ONE** Question from Each Section. All questions shall carry equal marks.

**Total Marks : 150**

**Theory Paper : 100**

**Internal Assessment : 50**

**Minimum Pass Marks : 40%**

**Maximum Time : 3 Hrs.**

#### SECTION - A

**Data Warehousing :** The Evolution Of Data Warehousing , Today's Development Environment, Types of Data and their Uses, Conceptual Data Architecture, Design Techniques, Introduction to the Logical Architecture.

**Data Mining:** Introduction: Motivation, Importance, data mining, kind of data, Functionalities, interesting patterns, Classification of data mining systems, Major issues. **Data Warehouse and OLAP Technology for Data Mining:** data warehouse, operational database systems and data warehouses, Architecture, Implementation, development of data cube technology, data warehousing to data mining, Data warehouse usage, Knowledge Discovery Process.

#### SECTION - B

**Data Preparation:** Data cleaning, Data integration and transformation, Data reduction, Discretization and concept hierarchy generation.

**Concept Description:** Characterization and Comparison, Data generalization and summarization-based characterization, Analytical characterization, analysis of attribute relevance, Mining class comparisons, Mining descriptive statistical measures in large databases.

#### SECTION - C

**Mining Association Rules in Large Databases:** Mining single-dimensional, multilevel association rules from transaction databases, Mining multidimensional association rules from relational databases and data warehouses, From association mining to correlation analysis, Constraint-based association mining.

**Classification and prediction :** issues, classification by decision induction, Bayesian classification, classification by back propagation, classification based on concepts from association rule mining other classification methods.

#### References:

- Data Mining, Alex Berson, Stephen Smith, Korth Theorling, TMH.
- Data Mining, Adriaans, Addison-Wesley Longman.
- Data Warehousing in the Real World, Anahory, Addison-Wesley Longman.
- Data Mining and Warehousing, Chanchal Singh, Wiley.

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- Data Mining, John E, Herbert P.
- Data Mining – Concepts and Techniques - Jiawei Han & Micheline Kamber Harcourt India.

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### ELECTIVES PAPERS

#### MCA-208(A) INFORMATION SECURITY

**Note:** Total **8 Questions** are to be set by the examiner covering the entire syllabus uniformly. **Question No. 1 (COMPULSORY)** having **Objective Type Questions** of **2 marks** from entire syllabus. Rest of the **Seven** questions are from **Section A, B & C** of **Syllabus**. A candidate is required to attempt any **Four questions** out of Sections A, B & C by selecting **ATLEAST ONE** Question from Each Section. All questions shall carry equal marks.

**Total Marks : 150**

**Theory Paper : 100**

**Internal Assessment : 50**

**Minimum Pass Marks : 40%**

**Maximum Time : 3 Hrs.**

#### SECTION A

**Security Attacks** (Interruption, Interception, Modification and Fabrication), Security Services (Confidentiality, Authentication, Integrity, Non-repudiation, access Control and Availability) and Mechanisms, A model for Internetwork security, Internet Standards and RFCs, Buffer overflow & format string vulnerabilities, TCP session hijacking, ARP attacks, route table modification, UDP hijacking, and man-in-the-middle attacks.

#### SECTION B

**Conventional Encryption Principles**, Conventional encryption algorithms, cipher block modes of operation, location of encryption devices, key distribution Approaches of Message Authentication, Secure Hash Functions and HMAC.

**Public key cryptography** principles, public key cryptography algorithms, digital signatures, digital Certificates, Certificate Authority and key management Kerberos, X.509 Directory Authentication Service.

**IP Security Overview**, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations and Key Management

#### SECTION C

**Web Security Requirements**, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET) Basic concepts of SNMP, SNMPv1 Community facility and SNMPv3, Intruders, Viruses and related threats.

**Firewall Design principles**, Trusted Systems, Intrusion Detection Systems

#### References:

- Network Security Essentials (Applications and Standards) by William Stallings Pearson Education.
- Hack Proofing your network by Ryan Russell, Dan Kaminsky, Rain Forest Puppy,
- Joe Grand, David Ahmad, Hal Flynn Ido Dubrawsky, Steve W. Manzuik and Ryan

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- Permeh, Wiley Dreamtech,
- Fundamentals of Network Security by Eric Maiwald (Dreamtech press)
  - Network Security - Private Communication in a Public World by Charlie Kaufman, Radia Perlman and Mike Speciner, Pearson/PHI.
  - Principles of Information Security, Whitman, Thomson.

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### MCA 208(B) E-COMMERCE

**Note:** Total **8 Questions** are to be set by the examiner covering the entire syllabus uniformly. **Question No. 1 (COMPULSORY)** having **Objective Type Questions** of **2 marks** from entire syllabus. Rest of the **Seven** questions are from **Section A, B & C** of **Syllabus**. A candidate is required to attempt any **Four** questions out of Sections A, B & C by selecting **ATLEAST ONE** Question from Each Section. All questions shall carry equal marks.

**Total Marks : 150**  
**Theory Paper : 100**  
**Internal Assessment : 50**

**Minimum Pass Marks : 40%**  
**Maximum Time : 3 Hrs.**

#### SECTION A

**Introduction:** Electronic Commerce - Technology and Prospects, Definition of E-Commerce, Economic potential of electronic commerce, Incentives for engaging in electronic commerce, forces behind E-Commerce, Advantages and Disadvantages, Architectural framework, Impact of E-commerce on business.

**Network Infrastructure for E- Commerce:** Internet and Intranet based E-commerce- Issues, problems and prospects, Network Infrastructure, Network Access Equipments, Broadband telecommunication (ATM, ISDN, FRAME RELAY).

#### SECTION B

**Mobile Commerce:** Introduction, Wireless Application Protocol, WAP technology, Mobile Information device, Mobile Computing Applications.

**Web Security:** Security Issues on web, Importance of Firewall, components of Firewall, Transaction security, Emerging client server, Security Threats, Network Security, Factors to consider in Firewall design, Limitation of Firewalls.

#### SECTION C

**Encryption:** Encryption techniques, Symmetric Encryption- Keys and data encryption standard, Triple encryption, Asymmetric encryption- Secret key encryption, public and private pair key encryption, Digital Signatures, Virtual Private Network.

**Electronic Payments:** Overview, The SET protocol, Payment Gateway, certificate, digital Tokens, Smart card, credit card, magnetic strip card, E-Checks, Credit/Debit card based EPS, online Banking. EDI Application in business, E- Commerce Law, Forms of Agreement, Govt. policies and Agenda.

#### *References:*

- Ravi Kalakota, Andrew Winston, "Frontiers of Electronic Commerce", Addison Wesley.
- Bajaj and Nag, "E-Commerce the cutting edge of Business", TMH
- P. Loshin, John Vacca, "Electronic commerce", Firewall Media, New Delhi
- Cryptography and network Security, Third edition, Stallings, PHI/Pearson
- Network Security: The complete reference, Robert Bragg, Mark Rhodes, TMH

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- Introduction to Cryptography, Buchmann, Springer.

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### MCA-208(C) LINUX & SHELL PROGRAMMING

**Note:** Total **8 Questions** are to be set by the examiner covering the entire syllabus uniformly. **Question No. 1 (COMPULSORY)** having **Objective Type Questions** of **2 marks** from entire syllabus. Rest of the **Seven** questions are from **Section A, B & C** of **Syllabus**. A candidate is required to attempt any **Four questions** out of Sections A, B & C by selecting **ATLEAST ONE** Question from Each Section. All questions shall carry equal marks.

**Total Marks : 150**

**Theory Paper : 100**

**Internal Assessment : 50**

**Minimum Pass Marks : 40%**

**Maximum Time : 3 Hrs.**

#### SECTION A

**Linux Startup:** Step by step procedure to Install Linux, User accounts, accessing linux - starting and shutting processes, Logging in and Logging out, Password administration, Command line, simple commands, Administration Commands.

**Linux file system:** Linux/Unix files system, inodes, file structure and file system related commands, Shell as command processor, Shell as command Prompt, Environment variables

#### SECTION B

**Shell Programming:** vi editor, shell variables, creating command substitution, scripts, functions, conditionals, loops,

**Regular Expressions and Filters:** Introducing regular expressions patterns, syntax, character classes, quantifiers, introduction to grep, egrep, fgrep, sed, programming with awk and perl.

**Processes in Linux:** Processes, starting and stopping processes, initialization Processes, rc and init files, job control - at, batch, cron, time.

#### SECTION C

Signals and signal handlers, Linux I/O system.

**The C Environment :** The C compiler, compiler options, managing projects, memory management, use of makefiles, dependency calculations, memory management - dynamic and static memory, building and using static and dynamic libraries, using ldd, soname, dynamic loader, debugging with gdb.

#### References:

- John Goerzen: Linux Programming Bible, IDG Books, New Delhi, 2000.
- Sumitabha Das: Your Unix - The Ultimate Guide, TMH, 2000.
- Petersan Richard, Red Hat Linux, The Complete Reference, TMH.
- Yashwant Kanetkar, Unix Shell Programming, BPB

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#### MCA-208(D) SOFTWARE QUALITY ASSURANCE & TESTING

**Note:** Total **8 Questions** are to be set by the examiner covering the entire syllabus uniformly. **Question No. 1(COMPULSORY)** having **Objective Type Questions** of **2 marks** from entire syllabus. Rest of the **Seven** questions are from **Section A, B & C** of **Syllabus**. A candidate is required to attempt any **Four questions** out of Sections A, B & C by selecting **ATLEAST ONE** Question from Each Section. All questions shall carry equal marks.

**Total Marks : 150**  
**Theory Paper : 100**  
**Internal Assessment : 50**

**Minimum Pass Marks : 40%**  
**Maximum Time : 3 Hrs.**

#### SECTION A

**Testing and the related concepts:** significance and potential; Testability and features of Test cases; software Testing techniques; WBT, BBT, Ticking Box testing; static analysis, symbolic testing, program mutation testing, input space, partitioning, functional program testing, data flow guided testing;

#### SECTION B

**software testing strategies:** Approach, Issues, integration, incremental, system, alpha, Beta testing etc.; comparative evaluation of techniques: Testing tools, Dynamic analysis tools, test data generators, Debuggers, test drivers etc. :Technical Metrics for Software: Quality factors, framework, Metrics for analysis, design, testing source code etc.

#### SECTION C

**Object Oriented Testing:** OOT strategies and issues: Test case design, interface testing; **Quality assurance:** concept, importance and essence; FTR, structured walk through technique etc.; SW Reliability, validation, safety and Hazards Analysis; Features affecting quality of software; SQA Plan, Quality models; ISO 9000 and SEI-CMM and their relevance.

#### References:

- Software testing by Boris Beizer, Academic Press.
- Art of Testing by G.J.Myers.
- Software Quality by Robert H.Dunn.
- Software Reliability by J.D.Musa, Okumota, Janino, McGraw Hill.

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### MCA-208(E) DESIGN AND ANALYSIS OF ALGORITHMS

**Note:** Total **8 Questions** are to be set by the examiner covering the entire syllabus uniformly. **Question No. 1 (COMPULSORY)** having **Objective Type Questions** of **2 marks** from entire syllabus. Rest of the **Seven** questions are from **Section A, B & C** of **Syllabus**. A candidate is required to attempt any **Four questions** out of Sections A, B & C by selecting **ATLEAST ONE** Question from Each Section. All questions shall carry equal marks.

**Total Marks : 150**

**Theory Paper : 100**

**Internal Assessment : 50**

**Minimum Pass Marks : 40%**

**Maximum Time : 3 Hrs.**

#### SECTION A

**Introductory Concepts:** Review of important data structures and programming techniques, analyzing algorithms, asymptotic notation, recurrence relations, introductory concepts in program verification and testing, Structured design methodology.

#### SECTION B

**Design Structures:** Outline of the general method, its illustration with several well chosen examples for the following basic algorithm design strategies :Divide & Conquer, Greedy method, Dynamic Programming, Basic search and traversal Techniques, Basic tracking, Branch and Bound.

#### SECTION C

**Lower Bound Theory :** Comparison trees, oracles and adversary arguments, techniques for algebraic problems, lower bounds on parallel computation.

**NP-Hard and NP-Complete Problems:** Basic concepts, Cook's theorem, examples of NP-Hard problems, approximation algorithms.

#### References:

- Horowitz, Ellis and Sahni, Sartaj, Fundamentals of Computer Algorithms, Galgotia Publications.
- Aho, Hopcroft, and Ullman, The Design and Analysis of Computer Algorithms, Addison Wesley.
- Horowitz, E. and Sahni, S., Fundamentals of Data Structure, Galgotia Publications.
- Trembley and Sorenson, An Introduction of Data Structures, with Applications, McGraw Hill.
- Goodman, S.E., and Hetedniemi, S.T., Introduction to the Design and Analysis of Algorithms, McGraw Hill.

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#### MCA-210(A) INTERNET AND INTRANET ENGINEERING

**Note:** Total **8 Questions** are to be set by the examiner covering the entire syllabus uniformly. **Question No. 1 (COMPULSORY)** having **Objective Type Questions** of **2 marks** from entire syllabus. Rest of the **Seven** questions are from **Section A, B & C** of **Syllabus**. A candidate is required to attempt any **Four questions** out of Sections A, B & C by selecting **ATLEAST ONE** Question from Each Section. All questions shall carry equal marks.

**Total Marks : 150**  
**Theory Paper : 100**  
**Internal Assessment : 50**

**Minimum Pass Marks : 40%**  
**Maximum Time : 3 Hrs.**

#### SECTION A

**Internet Architecture:** Introduction to Internet and Intranets, Internet Architecture, Inter-networking issues and components, Review of TCP/IP model, Internet addressing, IP address hierarchy and classes, IPv6, Internet routing, Interior and Exterior gateway protocols, CIDR, Multi-casting, Mobile Routing, Address Resolution Protocol (ARP), IP datagrams and datagram forwarding.

**Intranet Technologies:** Intranets integrated with LAN technologies, E-Mail representation and transfer, SMTP, MIME, E-Mail gateways, File transfer and remote file access, FTP, Network File Systems (NFS), Introduction to Novel Netware and Windows NT/2000.

#### SECTION B

**Web-Server & Client-Server Technology:** Web Servers, Web Access, Server Architectures, Links among servers, the client-server paradigm, the socket interface, DNS, CGI technologies for dynamic Web documents, WWW pages and browsing, Browser Architecture, Browser features and capabilities.

#### SECTION C

**Network Security and Management:** Aspects of security, Secure Networks and policies, Integrity mechanisms, Access control, Encryption and Authentication, Kerberos, Packet filtering, Internet firewalls, Proxy servers, Internet control message protocol (ICMP), Network management and SNMP, MIB, Concept of Network Management Software.

#### References:

- Internet and Intranet Engineering - Technologies, Protocols and Applications - Daniel Minoli, TMH.
- Computer Networks and Internets - Douglas E. Comer, Addison Wesley.
- An Engineering Approach to Computer Networking - S. Keshav, Addison Wesley.
- The ABCs of Intranets - Dyson, Coleman, Gilbert, BPB Publications.
- Business Data Communications and Networking - Jerry Fitzgerald, Alan Dennis, John Wiley and Sons.
- Internet Complete, BPB Publications.

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### MCA 210(B) DISTRIBUTED OPERATING SYSTEMS

**Note:** Total **8 Questions** are to be set by the examiner covering the entire syllabus uniformly. **Question No. 1 (COMPULSORY)** having **Objective Type Questions** of **2 marks** from entire syllabus. Rest of the **Seven** questions are from **Section A, B & C** of **Syllabus**. A candidate is required to attempt any **Four questions** out of Sections A, B & C by selecting **ATLEAST ONE** Question from Each Section. All questions shall carry equal marks.

**Total Marks : 150**

**Theory Paper : 100**

**Internal Assessment : 50**

**Minimum Pass Marks : 40%**

**Maximum Time : 3 Hrs.**

#### SECTION A

**Introduction to Distributed Systems:** Goals Hardware Concepts Software - design

**Communication distributed systems:** Layered Protocol: ATM Networks client server model - remote procedure call – group communication.

**Synchronization:** Clock synchronization - mutual exclusion - election atomic transactions - dead locks.

#### SECTION B

**Process and Processors:** Threads - System models processor allocation - scheduling fault tolerance - real time distributed systems.

**Distributed file systems:** File system design and implementation - trends in distributed file systems.

#### SECTION C

**Shared Memory:** Introduction - bus based multi processors ring based multiprocessors switched multiprocessors - NUMA comparison of shared memory systems- **consistency models** - page based distributed shared memory - shared variable distributed shared memory - object based distributed shared memory.

#### References:

- Andrew S. Tanenbaum: Distributed Operating System, Prentice Hall International Inc. 1995.
- Operating Systems - A Concept- Based Approach, D M Dhamdhere, 2<sup>nd</sup> Edition, TMH
- Pradeep K. Sinha, Distributed Operating Systems: Concepts and Design, PHI, New Delhi

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### MCA-210(C) PRINCIPLES OF PROGRAMMING LANGUAGES

**Note:** Total **8 Questions** are to be set by the examiner covering the entire syllabus uniformly. **Question No. 1 (COMPULSORY)** having **Objective Type Questions** of **2 marks** from entire syllabus. Rest of the **Seven** questions are from **Section A, B & C** of **Syllabus**. A candidate is required to attempt any **Four questions** out of Sections A, B & C by selecting **ATLEAST ONE** Question from Each Section. All questions shall carry equal marks.

**Total Marks : 150**  
**Theory Paper : 100**  
**Internal Assessment : 50**

**Minimum Pass Marks : 40%**  
**Maximum Time : 3 Hrs.**

#### SECTION A

**Preliminaries** - language paradigms, language criteria, language design trade-offs, influences on language design, bindings, type checking, and scopes, variables and data types: primitive data types, variables, structured data types. Abstraction: data abstraction, control abstraction, procedural abstraction.

**Formal languages and automata** - The Chomsky hierarchy of formal languages, regular grammars: regular expressions, finite automata, Context-free grammars: pushdown automata, ambiguous grammars.

#### SECTION B

**Imperative programming**- structured programming, procedure activations: parameter passing methods, scope rules, activation records.

**Object oriented programming** - messages, methods and encapsulation, classes and polymorphism, inheritance and object orientation, design issues for object oriented languages.

**Functional programming** - Features of functional languages, implementing functional languages, applications of functional languages.

#### SECTION C

**Logic programming** - Formal logical systems, implementations and applications.

**Languages for databases** - manipulating relational databases using SQL.

**Language constructs** for parallel processing - the paradigm, multiple processes, synchronization of cooperating processes.

#### References :

- Sebesta W. Robert, Concepts of programming languages 4th ed., (Addison Wesley - 2000)
- Appleby Doris & VandeKopple J. Julius, Programming languages-Paradigm and practice 2nd ed. (Tata McGraw Hill - 1999)
- Sethi Ravi, Programming languages 2nd ed. (Addison Wesley - 2000)

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### MCA-210(D) NETWORK MANAGEMENT & PROGRAMMING

**Note:** Total **8 Questions** are to be set by the examiner covering the entire syllabus uniformly. **Question No. 1 (COMPULSORY)** having **Objective Type Questions** of **2 marks** from entire syllabus. Rest of the **Seven** questions are from **Section A, B & C** of **Syllabus**. A candidate is required to attempt any **Four questions** out of Sections A, B & C by selecting **ATLEAST ONE** Question from Each Section. All questions shall carry equal marks.

**Total Marks : 150**  
**Theory Paper : 100**  
**Internal Assessment : 50**

**Minimum Pass Marks : 40%**  
**Maximum Time : 3 Hrs.**

#### SECTION A

**Telecommunication Network Architecture**, TMN management layers, Management information Model, Management servicing and functions, Structure of management information and TMN information model, SNMP v1, SNMP2 & SNMP3, RMON1 & 2, Broadband Network Management (ATM, HFC, DSL, ASN).

**Introduction to networking**, TCP/IP Protocol architecture, Classful internet addresses, subnets, super netting, address resolution Protocol (ARP) and RARP, IP datagram format, UDP and TCP/datagrams, ICMP its purpose, FINGER, NET STAT details & Ipconfig, Ping, TRACERT, ROUTE.

#### SECTION B

**Socket introduction**, elementary TCP sockets, TCP client server, I/O functions, select & poll functions, socket options, elementary UDP sockets, elementary node & address conversions, echo service (TCP & UDP).

**Algorithms and issues in server software design:** iterative connectionless servers (UDP), Iterative connection oriented services (TCP), single process, concurrent servers multiprotocol servers (TCP, UDP), multi service servers (TCP, UDP).

#### SECTION C

**Remote procedure call concept (RPC)** : RPC models, analogy between RPC of client and server, remote programs and procedures, their multiple versions and mutual exclusion communication semantics, RPC retransmits, dynamic port mapping, authentication.

**Network file system**, concept of data link access, debugging techniques, Routing sockets, broadcasting to mobile network.

#### References:

- Network Management Principles & Practices by Subramanian, Mani, AWL.
- SNMP, Stallings William, AWL.
- SNMP: A guide to Network Management, MGH.

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- Telecom Network Management by B.B.Wang, MGH.
- Network Management by U.Black, MGH.
- Unix Network Programming 2<sup>nd</sup> edition, W.Richard Stevens.
- Internetworking with TCP/IP Vol. I, Douglas E.Comer.
- Internetworking TCP/IP Vol. III, Douglas E.Comer, David L.Stevens.
- Internetworking with TCP/IP Vol. II, Douglas E.Comer.

## Regular Course (Scheme and Syllabus)

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#### MCA – 5<sup>th</sup> Semester

Sr. No.	Paper Code	Title of Paper	L	T	P	Sessional	Theory	Practical	Total	Credit
1.	MCA-301	Artificial Intelligence	3	1	-	50	100	-	150	4
2.	MCA-303	Advanced Java Programming	3	1	-	50	100	-	150	4
3.	MCA-305	Web Technology	3	1	-	50	100	-	150	4
4.	MCA-307	Elective – III	3	1	-	50	100	-	150	4
5.	MCA-309	Elective – IV	3	1	-	50	100	-	150	4
6.	MCA-323	Software Lab. - VIII, Java (Based on MCA-502)	-	-	3x 2	50	-	50	100	3
7.	MCA-325	Software Lab. - IX, XML, ASP, JSP, Perl (Based on MCA-503)	-	-	3x 2	50	-	50	100	3
8.	MCA-331	Seminar	-	-	-	100	-	-	100	1
		<b>Total</b>	<b>15</b>	<b>5</b>	<b>12</b>	<b>450</b>	<b>500</b>	<b>100</b>	<b>1050</b>	<b>27</b>

#### Elective -III

MCA-307(A)-Compiler Construction

MCA-307(B)-Object Oriented Analysis And Design

MCA-307(C)-Theory of Computation

MCA-307(D)-Human Computer Interaction

MCA-307(E)-Professional Issues in I.T.

#### Elective -IV

MCA-309(A)-Programming in C #

MCA-309(B)-Software Project Management

MCA-309(C)-Artificial Neural Networks

MCA-309(D)-Fuzzy Logic

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#### MCA – 301 ARTIFICIAL INTELLIGENCE

**Note:** Total **8 Questions** are to be set by the examiner covering the entire syllabus uniformly. **Question No. 1 (COMPULSORY)** having **Objective Type Questions** of **2 marks** from entire syllabus. Rest of the **Seven** questions are from **Section A, B & C** of **Syllabus**. A candidate is required to attempt any **Four questions** out of Sections A, B & C by selecting **ATLEAST ONE** Question from Each Section. All questions shall carry equal marks.

**Total Marks : 150**

**Theory Paper : 100**

**Internal Assessment : 50**

**Minimum Pass Marks : 40%**

**Maximum Time : 3 Hrs.**

#### Section – A

**Introduction:** Background and history, Overview of AI applications areas.

**The predicate calculus:** Syntax and semantic for propositional logic and FOPL, Clausal form, inference rules, resolution and unification.

**Knowledge representation:** Network representation-Associative network & conceptual graphs, Structured representation- Frames & Scripts.

#### Section – B

**Search strategies:** Strategies for state space search-data driven and goal driven search; Search algorithms-uninformed search (depth first, breadth first, depth first with iterative deepening) and informed search (Hill climbing, best first, A\* algorithm, mini-max etc.), computational complexity, Properties of search algorithms-Admissibility, Monotonicity, Optimality, Dominance, etc.

**Production system:** Types of production system, Control of search in production system.

#### Section - C

**Rule based expert systems:** Architecture, development, managing uncertainty in expert systems (Bayesian probability theory, Stanford certainty factor algebra, Nonmonotonic logic and reasoning with beliefs, Fuzzy logic, Dempster/Shaffer and other approaches to uncertainty).

**Knowledge acquisition:** Types of learning, learning automata, genetic algorithms, intelligent editors, learning by induction.

**Programming with Prolog:** Operators, Data Structure, Input & Output, Controlling Program Flow, String and Recursion.

#### References:

- E.Rich and K.Knight, Artificial Intelligence, Tata McGraw Hill.
- George F. Luger, William A. Stubblefield Artificial Intelligence, The Benjamin/Cummings Publishing Company, Inc.
- Dan W. Patterson Introduction to Artificial Intelligence and Expert system PHI.
- Eugene Charniak, Drew McDermott Introduction to Artificial Intelligence Addison Wesley-2000.
- Nils J. Nilsson Principles of Artificial Intelligence Narosa publishing house.
- Jackson Peter, Introduction to Expert systems, 3rd ed., (Addison Wesley -2000).

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- W.F.Clofisin and C.S. Mellish, Programming in Prolog, Narosa Publishing Co.
- Ivan Bratko, Prolog Programming for Artificial intelligence, Prearson ,3<sup>rd</sup> Edition.
- Artificial, Intelligence & Intelligent System, N. Padhy, Oxford press, New Delhi

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**MCA – 303    Advanced Java Programming**

**Note:** Total **8 Questions** are to be set by the examiner covering the entire syllabus uniformly. **Question No. 1 (COMPULSORY)** having **Objective Type Questions** of **2 marks** from entire syllabus. Rest of the **Seven** questions are from **Section A, B & C** of **Syllabus**. A candidate is required to attempt any **Four questions** out of Sections A, B & C by selecting **ATLEAST ONE** Question from Each Section. All questions shall carry equal marks.

**Total Marks : 150**

**Theory Paper : 100**

**Internal Assessment : 50**

**Minimum Pass Marks : 40%**

**Maximum Time : 3 Hrs.**

#### **SECTION - A**

**Java Servlets:** WWW, HTML basics, HTTP, MIME, CGI, Servlet, Life cycle of a Servlet, java.servlet package: GenericServlet, RequestDispatcher, Servlet, ServletConfig, SevletContext, ServletException, ServletRequest, ServletResponse., Reading Servlet parameters, java.servlet.http package:HttpServlet, HttpServletRequest, HttpServletResponse, HttpSession, Handling HTTP request and response, Cookies, Session Tracking.

#### **SECTION - B**

**Java Database Connectivity (JDBC):** RDBMS, Introduction to JDBC, JDBC Driver types, SQL: SELECT, INSERT, UPDATE, java. SQL package: DriverManager, Connection, Statement, ResultSet, SQLException, PreparedStatement.

#### **SECTION - C**

**Network Programming:** Client-Server model, IP Address, socket, port, TCP/IP v/s UDP, java. net package: URL, URI, InetAddress, Socket, ServerSocket, DatagramPacket, DatagramSocket.

**Remote Method Invocation (RMI):** RMI, Object Serialization, RMI layer model, Skelton, Stub, java.rmi package: Remote interface, Naming, RMISecurityManager, RemoteException, java.rmi.registry package: Registry interface, LocateRegistry, java.rmi.server package: RemoteObject, RemoteServer.

#### **References**

- H.M. Deitel, P.J. Deitel, Java How to Program, sixth edition, Pearson Education
- Cay S. Horstmann, Gray Cornell, Core Java 2 Volume II-Advanced Features, Sun Microsystems Press, Pearson Education
- Elliotte Rusty Harold, Java Network Programming, third edition, O'Reilly Publication.
- Herbert Schildt, The Complete Reference. Java, seventh edition, Tata McGrawHill.

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MCA – 305 Web Technology

**Note:** Total **8 Questions** are to be set by the examiner covering the entire syllabus uniformly. **Question No. 1 (COMPULSORY)** having **Objective Type Questions** of **2 marks** from entire syllabus. Rest of the **Seven** questions are from **Section A, B & C** of **Syllabus**. A candidate is required to attempt any **Four questions** out of Sections A, B & C by selecting **ATLEAST ONE** Question from Each Section. All questions shall carry equal marks.

**Total Marks : 150**

**Theory Paper : 100**

**Internal Assessment : 50**

**Minimum Pass Marks : 40%**

**Maximum Time : 3 Hrs.**

#### Section – A

**Web Engineering:** Definition, Components, Best Practices. Web Engineering Process, Design for Web Applications, Design Goals, Process, Quality.

**Information Architecture:** The Role of Information Architect, Collaboration and Communication, Organizing information, Designing Navigation Systems, Searching your Web Site, Designing the Search Interface, Indexing the Right Stuff, To Search or Not To Search, Grouping Content, Conceptual Design; High-Level Architecture Blueprints, Architectural Page Mockups, Design Sketches.

#### Section – B

Client/server side Programming, Basics JavaScript, Including scripts in HTML, JavaScript Language overview, Features of JavaScript, JavaScript object Model, control structure, form processing.

**Java Server Pages:** JSP Basics, alternative technologies, Integrating Scripts in JSP, JSP Objects and Components, Request and response objects, Application Model, Syntax and Semantics, Retrieving the Contents of an HTML form, Retrieving a Query String, Inserting Applets into JSP, Working with Beans. Cookies, configuring and troubleshooting, Using Application Event Listeners.

#### Section - C

**XML:** Relationship between SGML, HTML, XHTML and XML, Basic XML, Valid Documents. Ways to use XML, XML for Data Files, Embedding XML into HTML documents, Converting XML to HTML for DISPLAY, Displaying XML using CSS and XSL, Rewriting HTML as XML, The future of XML.

**Active Server Pages:** ASP basics, Request Object, Request Object, Server Object, ASP Component.

#### References:

- Thomas A Powell, The Complete Reference HTML & XHTML, Tata McGraw Hill.
- Peter Morville & Louis Rosenfield, Information Architecture for the World Wide Web, o'Reilly Series, SPD.
- Roger S Pressman, David Lows, Web Engineering A Practitioner's Approach, Tata McGraw Hill.
- Jose Annunziata, Java Server Pages in 24 hours.
- Pardi, XML in Action, Web Technology, PHI.
- Greg Buczek, ASP Developer's, Tata McGraw Hill.

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#### ELECTIVES PAPERS

#### MCA – 307(A) COMPILER CONSTRUCTION

**Note:** Total **8 Questions** are to be set by the examiner covering the entire syllabus uniformly. **Question No. 1 (COMPULSORY)** having **Objective Type Questions** of **2 marks** from entire syllabus. Rest of the **Seven** questions are from **Section A, B & C** of **Syllabus**. A candidate is required to attempt any **Four** questions out of Sections A, B & C by selecting **ATLEAST ONE** Question from Each Section. All questions shall carry equal marks.

**Total Marks : 150**  
**Theory Paper : 100**  
**Internal Assessment : 50**

**Minimum Pass Marks : 40%**  
**Maximum Time : 3 Hrs.**

#### Section – A

**Introduction to Compilation:** Compilers and phases of compilation, analysis-synthesis model of translation, compiler construction tools.

**Lexical Analysis:** Process of lexical analysis, finite state automata, DFA and NFA, recognition of regular expressions, LEX.

#### Section – B

**Syntax Analysis:** Process of syntax analysis, types of grammar, top-down and bottom-up parsing techniques, parser generator.

**Intermediate Code Generation:** Intermediate languages, generating intermediate code for declarative statement, assignment statement, boolean expression, and case statement.

#### Section – C

**Code Optimization:** Introduction to code optimization, potential cases of code optimization, optimization of basic blocks, loops in flow graphs, code improving transformation.

**Code Generation:** Issues in the design of a code generator, the target machine, dynamic storage management, translating basic blocks, a simple code generator, peephole optimization, directed acyclic graphs and basic blocks, code generation from directed acyclic graphs.

Overview of syntax directed translation scheme.

#### References :

- Compilers : Principles, Techniques & Tools, By Aho, Ullman, & Sethi (Addison Wesley)
- Principles of Compiler Design, By Aho & Ullman (Narosa Publications)
- Practice & Principles of Compiler Building with C, By Henk Alblas et al. (PHI)
- Principles of Compiler Design, By Trembley & Sorenson (McGraw Hill)

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#### MCA – 307(B) OBJECT ORIENTED ANALYSIS AND DESIGN

**Note:** Total **8 Questions** are to be set by the examiner covering the entire syllabus uniformly. **Question No. 1 (COMPULSORY)** having **Objective Type Questions** of **2 marks** from entire syllabus. Rest of the **Seven** questions are from **Section A, B & C** of **Syllabus**. A candidate is required to attempt any **Four questions** out of Sections A, B & C by selecting **ATLEAST ONE** Question from Each Section. All questions shall carry equal marks.

**Total Marks : 150**

**Theory Paper : 100**

**Internal Assessment : 50**

**Minimum Pass Marks : 40%**

**Maximum Time : 3 Hrs.**

#### Section – A

**Basic Concepts: Complexity:** Complexity of Software, Structure and designing of Complex systems. **Object Model:** Evolution, Elements and application of Object Model. **Classes and Objects:** Nature and relationships among objects, Nature and relationship among class. **Classification:** Importance and Identification of Classes and Objects

#### Section – B

**Basic and Advanced Modeling Concepts:** Modeling, Abstraction, The three models (Class, State, Interaction). **Class and Advanced Class Modeling:** Object and class Concepts, link and association concepts, Generalization and Inheritance. Advanced Object and class Concepts, Association Ends, N-Ary Associations, aggregation, Abstract Classes, Multiple Inheritance, Metadata, Reification, constraints, Derived Data.

#### Section – C

**Analysis and Design:** Process Overview; Development stages and Life cycle. **System Conception:** designing and elaborating a systems concepts. **Analysis:** Domain Analysis and Application Analysis; Class Model, State Model, Interaction Model. **Systems Design:** system and Class Design; breaking system into subsystems, management of data storage, refactoring, design optimization.

#### References :

- Grady Booch, Object Oriented Analysis and Design with Applications, Second Edition Pearson Education, 2007
- Michael Blaha, James Rumbaugh – Object – Oriented Modeling and Design with UML, Second Edition. Pearson Education, 2007
- Meilir Page-Jones: Fundamentals of Object Oriented Design in UML, Pearson Education.
- Atul Kahate: Object Oriented Analysis & Design, The McGraw-Hill Companies.
- Mark Priestley: Practical Object-Oriented Design with UML, TATA McGrawHill

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#### MCA – 307(C) THEORY OF COMPUTATION

**Note:** Total **8 Questions** are to be set by the examiner covering the entire syllabus uniformly. **Question No. 1 (COMPULSORY)** having **Objective Type Questions** of **2 marks** from entire syllabus. Rest of the **Seven** questions are from **Section A, B & C** of **Syllabus**. A candidate is required to attempt any **Four questions** out of Sections A, B & C by selecting **ATLEAST ONE** Question from Each Section. All questions shall carry equal marks.

**Total Marks : 150**

**Minimum Pass Marks : 40%**

**Theory Paper : 100**

**Maximum Time : 3 Hrs.**

**Internal Assessment : 50**

#### Section – A

Regular sets and regular expressions; Deterministic and Non-Deterministic finite automata, equivalence of deterministic and non-deterministic finite acceptors, Kleen's characterization theory for sets accepted by finite automata, finite state machines and their relations to combinatorial switching circuits, complexity, Regular sets, State equivalence and state minimization of finite automata, Algebra decomposition and structure theory, Hantmannis systems structure theory, Semigroups and Krobu Rhodes decomposition, generalized segmental machines.

#### Section – B

Chomsky to Greibiech normal form theorems, Self embedding, ambiguity, Equivalence of context free languages and sets accepted by non-deterministic push down store automata, closure properties of context free languages, Coke-Kasami-Young algorithm, top-down and bottom-up methods, Deterministic push-down automata and parsing, deterministic context free languages, Restrictions of push-down automata, parsing algorithms and compiler design.

#### Section – C

Multitape turing machines and related formalism for recognition, Unsolvability of the halting problem, reduction of post correspondence problem to the halting problem, Undecidable properties of grammars, program correctness, Algorithms complexity.

#### References:

- Lewis, H.R & Papadimitrious, C.H. Elements of the theory of computation. PHI
- Salomma, A.K. Formal languages, Academic press.
- Hopcroft, J.E. & Ullman, J.D. Formal languages and their relation to Automata Addison- Wesley
- E.V. Krishnamurthy Introductory theory of computer science East-West press pvt. ltd.
- Zoha Mauna Mathematical theory of computation, Wiley inter-science.
- John Minsky, Theory of computation, PHI.
- Greenberg M., Introduction to Automata Theory, Addison Wesley.

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#### MCA – 307(D) Human Computer Interaction

**Note:** Total **8 Questions** are to be set by the examiner covering the entire syllabus uniformly. **Question No. 1 (COMPULSORY)** having **Objective Type Questions** of **2 marks** from entire syllabus. Rest of the **Seven** questions are from **Section A, B & C** of **Syllabus**. A candidate is required to attempt any **Four questions** out of Sections A, B & C by selecting **ATLEAST ONE** Question from Each Section. All questions shall carry equal marks.

**Total Marks : 150**

**Theory Paper : 100**

**Internal Assessment : 50**

**Minimum Pass Marks : 40%**

**Maximum Time : 3 Hrs.**

#### Section – A

##### **Introduction & overview of HCI.**

Objectives of course, Course administration, Review of course plan, A (semi) complete history of computer user interfaces, HCI - history and intellectual roots, Research.

Human information processing limitations, human decision making.

Human cognitive and sensory limits, Human memory, Human problem solving, Skill acquisition, Users' conceptual models (mental models), Decision making.

Computer systems and user interfaces, human-system interaction.

Input and output devices, Mechanics of particular devices, Speech input, sound and speech output, Computer architecture, Performance characteristics of humans and systems, Color issues, Computer graphics, Color representation, color maps, color range of devices.

##### **Interaction models and metaphors.**

Use of abstract metaphors for describing interface behavior, Use of metaphors to support user understanding, Dialog input and output techniques and purposes, Screen layout issues, Dialog interaction: types and techniques, navigation and orientation, multimedia and non-graphical dialogues, Dialog issues.

#### Section – B

Principles guiding well-designed human-system interaction.

Paradigms for interaction, Principles to support usability, Accounting for users with disabilities.

The design process - overview.

The typical software development lifecycle(idealized vs. actual), User-centered design overview, “Three pillars of design”, Usability engineering overview, Reconciling UCD and usability testing.

The design process – making use of task and user data for system design.

Use cases, scenarios, Structuring the information, Information architecture, User and process flows, Wireframes, Mockups, comps, Other methods of conveying structure and function

#### Section – C

Verifying the design – usability evaluation and testing.

Terms, Overview of methods – professional evaluation vs. testing, Usability testing, pluralistic cognitive walkthrough, When to use which method.

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Computer-supported cooperative work; organizational and social issues.

Interaction types, Computer systems for group tasks, workflow, Applications of CSCW, Socio-technical systems, impact of systems on work and vice versa, Quality of work life and job satisfaction.

HCI in mission-critical and high-risk environments.

Safety implications of human-computer interaction, Effects of automation, Addressing the effects

#### **References:**

- Human Computer Interaction Dix, A et al. Prentice Hall 1993
- The Art of Human-Computer Interface Design Laurel, B Addison-Wesley 1990
- "Designing the User Interface", B. Shneiderman, 2nd Edn., Addison-Wesley, 1992.
- "Readings in Human-Computer Interaction", (Eds) R.Baeker & W.Buxton, Morgan Kaufmann, 1987.
- "An Introduction to Human-Computer Interaction", P. Booth, LEA, 1989.
- "The Human Interface", R. Bolt, Wadsworth Inc, 1984.
- Human-Computer Interaction, Preece J, Addison-Wesley, (1996), ISBN 0-201-62769.

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MCA – 307(E) Professional Issues in IT

**Note:** Total **8 Questions** are to be set by the examiner covering the entire syllabus uniformly. **Question No. 1 (COMPULSORY)** having **Objective Type Questions** of **2 marks** from entire syllabus. Rest of the **Seven** questions are from **Section A, B & C** of **Syllabus**. A candidate is required to attempt any **Four questions** out of Sections A, B & C by selecting **ATLEAST ONE** Question from Each Section. All questions shall carry equal marks.

**Total Marks : 150**

**Theory Paper : 100**

**Internal Assessment : 50**

**Minimum Pass Marks : 40%**

**Maximum Time : 3 Hrs.**

#### Section – A

**Legal Issues:** Introduction to legal concepts, Basic outline of Criminal and Civil Laws, Concepts relating to laws of Contract and Commercial Law, Cyber crime, Data protection principles and implications of the European Union Data Protection Directive, Confidentiality and privacy, Intellectual property rights, Copyright and Industrial Property, Patents, Trade Marks and laws relating to designs, Software Protection and piracy, Dealing with Copyright, Originality, Exception to Copyright infringement, Employees and freelance programs, devices to overcome protection.

#### Section – B

Software Licensing, Methods of licensing, Copyright & electronic publishing, Copyright problems posed by electronic publishing.

**Multimedia, licensing and related issues:** Protection of Databases, Trade marks and passing off, Internet related issues, Contract issues and Law, Basic understanding of the Types of Agreements in large computerization projects – Implementation Agreements, License Agreements, Maintenance agreements etc., Enforcement issues, dispute resolution, arbitration, legislative action.

#### Section – C

**Other Professional Issues:** Duties of a professional, Duties to client, Duties to Employer, Duties to profession, Duties to society, Human relationships and change management, Avoiding computer misuse, Hacking, unauthorized access and types of Computer Crime, Introduction of Viruses, Fraud and types of Computer Fraud, Public interest and Social implications, Environmental protection, Health and safety issues, Privacy, Ethics and Codes of Professional Conduct, The need for professional ethics, Characteristics of professions, Integrity & Honesty, Competence, Professional development, judgment, knowledge of law, relations, standards, independence, Acting with responsibility, professional skill, comply with law, Confidentiality, due care, Contribute towards advancement of human welfare, Public interest, Public awareness, Basic human rights, Ethics and the Internet, Netiquette and Policy approaches, Professional relationships, Are computer professionals “Professionals”, Conflicting responsibilities and misconduct, Codes of Ethics.

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#### **References:**

- Bott F. et al. Professional Issues in Software Engineering (2nd edition.), UCL Press. 1995. ISBN: 1-85728-450-X BP.
- Myers C., Hall T. and Pitt D., (Eds), The Responsible Software Engineer: Selected Readings in IT Professionalism, Springer, 1997, ISBN: 3-540-76041-5.

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#### MCA – 309(A) Programming in C#

**Note:** Total **8 Questions** are to be set by the examiner covering the entire syllabus uniformly. **Question No. 1 (COMPULSORY)** having **Objective Type Questions** of **2 marks** from entire syllabus. Rest of the **Seven** questions are from **Section A, B & C** of **Syllabus**. A candidate is required to attempt any **Four questions** out of Sections A, B & C by selecting **ATLEAST ONE** Question from Each Section. All questions shall carry equal marks.

**Total Marks : 150**

**Theory Paper : 100**

**Internal Assessment : 50**

**Minimum Pass Marks : 40%**

**Maximum Time : 3 Hrs.**

#### Section - A

**Introduction to C#:** What is C#, Why C#, Comparison b/w C++, C# and Java, Characteristics of C#. The C# Environment: What is the .Net Framework, Relationship b/w .Net Framework & C#.

**Overview of C#:** Literals, Variables, data-types, value types, reference types, default value, constants variables, scope of variables, Boxing and Unboxing, Operators and Expressions, Control constructs: Decision making & Loops.

#### Section – B

Methods in C#, Method Overloading, Arrays & Strings, Structures & Enumerations

Classes & Objects, Overloaded Constructors & Static Constructors, Private & Copy Constructors, Garbage Collection & Destructors,

this Reference, Constant & Read-only Members, Inheritance & Polymorphism, Visibility Control, Overriding

#### Section - C

Sealed Classes & Methods, Abstract Classes and Methods, Interfaces, Indexers & Properties, Collections, Enumerators and Iterators.

Managing Console I/O & File Stream Operations, Exception Handling, Multithreading in C#, Windows Programming, Delegates & Events, Interfacing with COM, automatic memory management.

#### Reference :

- Programming in C# by E. Balaguruswamy, Tata McGraw-Hill
- The Complete Reference: C# by Herbert Schildt, Tata McGraw-Hill
- Programming in C# by Barbara Doyle, Cengage Learning India Pvt. Ltd.

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- Deitel Developer Series – C# for Programmers by Harvey M. Deitel & Paul J. Deitel, Pearson Education
- C# Programming Bible by Ferguson, Patterson, Beres, Boutquin & Gupta, Wiley India

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#### MCA – 309(B) SOFTWARE PROJECT MANAGEMENT

**Note:** Total **8 Questions** are to be set by the examiner covering the entire syllabus uniformly. **Question No. 1 (COMPULSORY)** having **Objective Type Questions** of **2 marks** from entire syllabus. Rest of the **Seven** questions are from **Section A, B & C** of **Syllabus**. A candidate is required to attempt any **Four questions** out of Sections A, B & C by selecting **ATLEAST ONE** Question from Each Section. All questions shall carry equal marks.

**Total Marks : 150**

**Theory Paper : 100**

**Internal Assessment : 50**

**Minimum Pass Marks : 40%**

**Maximum Time : 3 Hrs.**

#### Section – A

**Software Project Management:** Conventional approach, Software Project Management phases, Boehm's top 10 industrial software metrics, 7-S of Project Management, Three generations of software economics. Software cost estimation process, Modern trends of SPM for Improving software economics, software processes and team effectiveness, Round-trip engineering, Principles of modern software management.

#### Section – B

**A software management process framework:** Life cycle phases - inception, elaboration, construction and training phase. Artifacts of the process - the artifact sets, management artifacts, engineering artifacts, pragmatics artifacts. Model based software architectures. Workflows of the process. Checkpoints of the process.

#### Section – C

**Software management disciplines:** Iterative process planning. Project organizations and responsibilities. Process automation. Project control and process instrumentation - core metrics, management indicators, life cycle expectations. Process discriminants.

#### References :

- Software Project management, Walker Royce, Addison Wesley, 1998.
- Project management 2/e, Maylor.
- Information Technology Project Management, 4/E, Kathy Schwalbe, Cengage Learning
- Managing the Software Process, Humphrey.

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From Session: 2011-12

#### MCA – 309(C) ARTIFICIAL NEURAL NETWORK

**Note:** Total **8 Questions** are to be set by the examiner covering the entire syllabus uniformly. **Question No. 1 (COMPULSORY)** having **Objective Type Questions** of **2 marks** from entire syllabus. Rest of the **Seven** questions are from **Section A, B & C** of **Syllabus**. A candidate is required to attempt any **Four questions** out of Sections A, B & C by selecting **ATLEAST ONE** Question from Each Section. All questions shall carry equal marks.

**Total Marks : 150**

**Theory Paper : 100**

**Internal Assessment : 50**

**Minimum Pass Marks : 40%**

**Maximum Time : 3 Hrs.**

#### Section - A

**Fundamental of Neural Networks:** Overview of Biological neurons, neuron concept, single layer neural network, notation and representation of neural networks, training of ANNs.

**Single Layer Neural network:** Representation of perceptron and issues, perceptron learning and training, classification, Linear separability, structure of Hopfield nets, training, application and stability.

#### Section - B

**Backpropagation:** Backpropagation training algorithm, application of back propagation, advance algorithms.

**Counter propagation networks:** Kohonen network, Grossberg layer, application of counter propagation, Image classification.

#### Section - C

**Multilayer Neural Networks:** BAM structure retrieving a stored association, encoding the association, memory capacity, ART architecture, ART classification operation, cognitron and neocognitron.

#### References:

- Jock. M. Juroda, "Artificial Neural Systems".
- Kevin Gurney, "Introduction to Neural Networks: (UCL Press).
- Philip D. Wasserman, Neural Computing and Practice, ANZA Research Inc.

## Regular Course (Scheme and Syllabus)

### MASTER OF COMPUTER APPLICATIONS (MCA)

Faculty of Information Technology and Computer Science

Deenbandhu Chhotu Ram University of Science & Technology, Murthal (Sonapat),

Haryana, India

From Session: 2011-12

#### MCA – 309(D) FUZZY LOGIC

**Note:** Total **8 Questions** are to be set by the examiner covering the entire syllabus uniformly. **Question No. 1 (COMPULSORY)** having **Objective Type Questions** of **2 marks** from entire syllabus. Rest of the **Seven** questions are from **Section A, B & C** of **Syllabus**. A candidate is required to attempt any **Four questions** out of Sections A, B & C by selecting **ATLEAST ONE** Question from Each Section. All questions shall carry equal marks.

**Total Marks : 150**

**Theory Paper : 100**

**Internal Assessment : 50**

**Minimum Pass Marks : 40%**

**Maximum Time : 3 Hrs.**

#### Section - A

**Introduction:** Crisp sets, Fuzzy sets, Representations of fuzzy sets, Extension principle for fuzzy sets; types of operations, Fuzzy complements, Fuzzy intersections, fuzzy union, combinations of operations, Aggregation operations.

**Fuzzy arithmetic:** Fuzzy numbers, linguistics variables, operation on internals, Operation on fuzzy numbers, Fuzzy relations: projections and cylinder extensions, Primary fuzzy relations, Binary relations on single set, Fuzzy equivalence relations, Fuzzy ordinary relations.

#### Section - B

**Fuzzy logic:** Overview of classical logic, Multivalued logic, fuzzy propositions, fuzzy quantifiers, Inference; Conditional fuzzy proportions, conditional and qualified proposition. Quantified propositions. Uncertainty-based information.

#### Section - C

**Applications:** Approximate reasoning, pattern recognition, fuzzy databases and information retrieval systems, fuzzy linear programming, Fuzzy regression, Interpersonal communication.

#### References:

- George J.Keln, Boyuan, "Fuzzy sets and fuzzy logic," PHI.

