SCHEME OF EXAMINATION

&

DETAILED SYLLABUS

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

For

MASTER OF COMPUTER APPLICATIONS (MCA) DEGREE

Third Semester

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

Master of Computer Applications

THIRD SEMESTER EXAMINATION

Paper ID	Paper Code	Paper	L	T/P	Credit
044201	MCA 201	Theory of Computation	3	1	4
044203	MCA 203	Computer Graphics	3	1	4
044205	MCA 205	Java Programming	3	1	4
044207	MCA 207	Data Communications and Networking	3	1	4
044209	MCA 209	C# Programming	3	1	4
Practical					
044251	MCA 251	Computer Graphics Lab	0	2	1
044253	MCA 253	Java Programming Lab	0	4	2
044255	MCA 255	C# Programming Lab.	0	4	2
NUES					
044261	MCA 261	General Proficiency – III* (It is suggested to have Technical Paper Writing Course)	0	2	1
		Total	**15**	**17**	**26**

*** Non-University Examination System (NUES)**

Code No. MCA 201 **L T C**
Paper: Theory of Computation **3 1 4**

INSTRUCTIONS TO PAPER SETTERS:

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

OBJECTIVES:

This course is extensive and theoretical treatment of issues in Computability and Complexity; Topics include Automata and Language Theory, Computability Theory, and Complexity Theory. Learning outcome of this course will be theoretical treatment of following

- *What can be computed and how fast it can be done?*
- *Use of Automata and Language theory in the development of different modules of a compiler as a case study.*

PRE-REQUISITE:

- Discrete Mathematics
- Skills in writing Formal Mathematical Proofs

UNIT - I

Automata and Language Theory: Overview of Theoretical Computer Science (including computationally intractable problems) , Introduction to System software including various phases / Modules in the design of a typical compiler , Chomsky Classification, Finite Automata, Deterministic Finite Automata (DFA), Non-Deterministic Finite Automata (NFA),statement of Kleen's Theorem, Regular Expressions, Equivalence of DFAs, NFAs and Regular Expressions, Closure properties of Regular Language, Non-Regular Languages, Pumping Lemma. Myhill Nerode Theorem, Use of Regular expressions in the Design of scanner (lexical analyzer). Introduction to JFLAP Simulation. **[No. of Hr: 12]**

UNIT - II

Context Free Languages: Context Free Grammar (CFG), Parse Trees, Push Down Automata (deterministic and nondeterministic) (PDA), Equivalence of CFGs and PDAs, Closure properties of CFLs, Pumping Lemma, Parsing (including LL(1) , SLR and LR(1) Parsing Method).

[No. of Hr.: 12]

UNIT - III

Turing Machines and Computability Theory: Definition of Turing Machine, Extensions of Turing machines, Non – deterministic Turing machines, Equivalence of various Turing Machine Formalisms, Church – Turing Thesis, Decidability, Halting Problem, Reducibility, Recursion Theorem. **[No. of Hr: 10]**

UNIT - IV

Complexity Theory: Time and Space measures, Hierarchy theorems, Complexity classes P, NP, space complexity , Savich theorem , L, NL, PSPACE complexity , Post correspondence problem, Probabilistic computation.

[No. of Hr: 6]

TEXT BOOKS:

1. J. C. Martin, "Introduction to Languages and the Theory of Computation", TMH, 3rd Ed. 2007.

2. M. Sipser, "Introduction to the Theory of Computation", Cengage Publication, 2006.
3. J. Hopcroft, R. Motwani, and J. Ullman, "Introduction to Automata Theory, Language and Computation", Pearson, 2nd Ed., 2006.
4. Wayne Goddard, "Introducing the Theory of Computation", Jones & Bartlett Student Ed.

REFERENCES:

1. Dexter C. Kozen "Theory of Computation ", Springer 2006.
2. H. R. Lewis and C. H. Papadimi Triou, "Elements of the Theory of Computation", Pearson, 2nd Ed., 1997.
3. D. Cohen, "Introduction to Computer Theory, Wiley, N. York, 2nd Ed., 2008.
4. K. L. Mishra and N. Chandrasekharan, "Theory of Computer Science Automata Language Computation", PHI, 3rd Ed., 2007.
5. Susan H. Rodger, "JFLAP: An interactive Formal Languages and Automata Package", Jones & Bartlett, 2009.
6. Peter Linz, "Introduction to Formal Languages and Automata", Narosa.
7. Sudkamp, "Languages and Machines", Pearson Education, 2007.
8. Bernard Moret, "Theory of Computation", Pearson Education, 2008.

Code No. MCA 203 **L T C**
Paper: Computer Graphics **3 1 4**

INSTRUCTIONS TO PAPER SETTERS:

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

OBJECTIVES: *Computer graphics is used in diverse applications from the visualization of complex scientific data to the special effects in computer games. The objective of this course is to introduce the programming principles of computer graphics. The course will cover Practical programming through C, and mathematical and theoretical foundations.*

PRE-REQUISITE:

- Mathematical Concepts

UNIT-I

Scan conversion: Scan converting a point, line (Bresenham's, *DDA)*, 2-D transformations (Rotation, Rotation about an arbitrary line, Scaling, Translation, Shearing, Reflection, and Reflection about an arbitrary line), circle and ellipse.

Transformation: 2D transformation, Basic Transformation, Various 2D and 3D Transformation matrices (Translation, Rotation, Scaling, Shearing and Reflection), Composite transformations: Reflection, Shearing and Transformation between coordinate Systems. Rotation about : (i) an arbitrary axis (ii)about an arbitrary point. **[No. of Hrs: 10]**

UNIT-II

Curves and Surfaces Bezier Curves, 4 point and 5 point Bezier curves using Bernstein Polynomials, Conditions for smoothly joining curve segments, Bezier bi-cubic surface patch, B-Spline Curves, Cubic B-Spline curves using uniform knot vectors, first and second order continuities, Effect of multiple control points at same location, Geometrical Construction, Computing control points given end slopes for a specified curve segment. **[No. of Hrs. : 10]**

UNIT-III

Transformations: 3-D Transformation, Computing location of V.P, 2-D viewing, Window-to-view port transformation

Clipping: Line Clipping; Sutherland Cohen clipping algorithms, Sutherland-Hodgeman.

Projection: Parallel and Perspective Projections

Solid Modeling: Sweeping a polygon or a surface patch along a path to form solids, Boundary Representation (B-Rep), octrees, CSG – Constructive Solid Geometry. **[No. of Hrs: 10]**

UNIT-IV

Shading: Shading, Illumination Model for diffused Reflection, Effect of ambient lighting & distances, Specular Reflection Model, Computing Reflection Vector, Curved Surfaces, Polygonal Approximations, Gourard Shading, Phong Model.

Hidden Surface Removal: Floating Horizon Method, Depth Buffer (Z-Buffer, A-Buffer) Method, Scan Line Method, Depth Sorting Method, BSP- tree Method, Area Subdivision Method. **[No. of Hrs: 12]**

TEXT BOOKS:

1. Foley James D, "Computer Graphics", AW 2nd Ed.
2. Rogers, "Procedural Element of Computer Graphics", McGraw Hill.
3. Donnald Hearn and M. Pauline Baker, "Computer Graphics", PHI.

REFERENECS:

1. Ven Harrington, "Computer Graphics: A programming Approach", TMH.
2. Newman and Sproul, "Principal of to Interactive Computer Graphics", McGraw Hill.
3. Roge and Adams, "Mathematics Element of Computer Graphics", McGraw Hill.
4. R. Plastock and G Kalley, "Theory and Problems of Computer Graphics", Schaum's Series, Mc Graw Hill, 1986.
5. F. S. Hill, Jr. Stephen M. Kelley, "Computer Graphics using Open GL", PHI, 3rd Ed., 2009.
6. Malay K. Pakhira, "Computer Graphics Multimedia Animation", PHI, 2008.

Code No.: MCA 205 **L T C**
Paper: Java Programming (Core & Advance Java) **3 1 4**

INSTRUCTIONS TO PAPER SETTERS:

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

OBJECTIVE: *In this course student will become familiar with features of Java language, they will learn how to write Java code according to Object-Oriented Programming principles, how to design GUI applications and Applets using AWT, how to develop multithreaded and Networking applications and how to create dynamic pages.*

PRE-REQUISITES:

- Basic Object Oriented Programming Concepts

UNIT – I

Importance and features of Java, *Language Construct of java including* Keywords, constants, variables and looping and decision making construct, Classes and their implementation, Introduction to JVM and its architecture including set of instructions. Overview of JVM Programming . Internal and detailed explanation of a valid .class file format. Instrumentation of a .class file, Byte code engineering libraries, Overview of class loaders and Sandbox model of security.

Introducing classes, objects and methods: defining a class, adding variables and methods, creating objects, constructors, class inheritance. Arrays and String: Creating an array, one and two dimensional arrays, string array and methods, Classes: String and String Buffer classes, Wrapper classes: Basics types, using super, Multilevel hierarchy abstract and final classes, Object class, Packages and interfaces, Access protection, Extending Interfaces, packages.

[No. of Hrs.: 12]

UNIT – II

Exception Handling: Fundamentals exception types, uncaught exceptions, throw, throw, final, built in exception, creating your own exceptions,

Multithreaded Programming: Fundamentals, Java thread model: priorities, synchronization, messaging, thread classes, Runnable interface, inter thread Communication, suspending, resuming and stopping threads.

Input/Output Programming: Basics, Streams, Byte and Character Stream, predefined streams, Reading and writing from console and files.

Using Standard Java Packages (lang, util, io, net). Networking: Basics, networking classes and interfaces, using java.net package, doing TCP/IP and Data-gram Programming, RMI (Remote Method Invocation). **[No. of Hrs.: 10]**

UNIT – III

Event Handling: Different Mechanism, the Delegation Event Model, Event Classes, Event Listener Interfaces, Adapter and Inner Classes, Working with windows, Graphics and Text, using AWT controls, Layout managers and menus, handling Image, animation, sound and video, Java Applet**.**

The Collection Framework: The Collection Interface, Collection Classes, Working with Maps & Sets

JDBC: Introduction to DBMS & RDBMS, DBC API, JDBC Application Architecture, Obtaining a Connection, JDBC Models: Two Tier and Three Tier Model, ResultSet, Prepared Statement, Callable Statement. **[No. of Hrs: 09]**

UNIT – IV

RMI (Remote Method Invocation): Introduction, Steps in creating a Remote Object, Generating Stub & Skeleton, RMI Architecture, RMI packages.

Java Bean: Introduction, Bean Architecture, Using the Bean Development Kit, Creating simple bean-properties, methods and events, Packing beans- the manifest & the jar, Java bean package, Introduction to NetBean.

Swing : Introduction to JFC (Java Foundation Classes), Features of Swing, Comparison with AWT, Advanced Control. **[No. of Hrs.: 11]**

TEXT BOOKS:

1. Patrick Naughton and Herbertz Schildt, "Java-2: The Complete Reference", TMH, 1999.
2. Bill Vanners, "Inside Java Virtual Machine", TMH, 2nd Ed.
3. Rick Dranell, "HTML 4 unleashed", Techmedia Publication, 2000
4. Shelley Powers, "Dynamic Web Publishing", 2nd Ed., Techmedia, 1998.
5. Paul Dietel and Harvey Deitel, "Java How to Program", PHI, 8th Ed., 2010.

REFERENCES:

1. E. Balaguruswamy, "Programming with Java: A Primer", TMH, 1998.
2. Horstmann, "Computing Concepts with Java 2 Essentials", John Wiley.
3. Decker and Hirshfield, "Programming Java: A Introduction to Programming Using JAVA", Vikas Publication, 2000.
4. N.P Gopalan and J. Akilandeswari, "Web Technology- A Developer's Perspective", PHI, 2007.
5. Eric Jendrock, Jennfer Ball and Debbei Carson, "The Java #EE5 Tutorial", Pearson, 3rd Ed., 2007.
6. Daniel Liang, "Introduction to Java Programming", Pearson, 7th Ed., 2010.

Code No. MCA 207 **L T C**

Paper: Data Communications and Networking **3 1 4**

INSTRUCTIONS TO PAPER SETTERS:

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

OBJECTIVE:

This course covers theory and practice of data communication between computing devices. Topics include network architecture and topology, Basics of networking and protocols, OSI network layered models and Application layer protocols.

PRE-REQUISITE:

- Basic Networking
- Operating System Concepts

UNIT - I

Introductory Concepts: Goals and Applications of Networks, Network structure and architecture, the OSI reference model, services, networks topology. **Physical Layer:** The Physical Layer, Theoretical Basis for Data Communication, Guided Transmission Media, Wireless Transmission, Communication Satellites Digital Signal Encoding Formats – NRZ-L, NRZI, bipolar-AMI, Manchester, Differential Manchester, Digital Modulation – ASK, FSK, PSK, PSK, Digitization – Sampling Theorem, PCM, DM, Analog Modulation – Introducing AM, FM, PM, The Mobile Telephone System. **[No of Hrs.: 11]**

UNIT - II

The Data Link Layer: Data Link Layer Design Issues, Error Detection and Correlation, Flow Control Protocols, Stop-and-wait Flow Control, Sliding – Window Flow Control, Error Control, Stop-and-wait ARQ, Go-back-N, Selective-repeat, Example of Data Link Protocols-HDLC **Medium access sub layer:** Channel allocations, ALOHA Protocols, Carrier Sense Multiple Access Protocols, CSMA with Collision Detection, Collision free protocols, Ethernet, wireless LANs, Blue Tooth, Data Link Layer Switching. **[No. of Hrs.: 11]**

UNIT - III

Network Layer: Point-to-Point network, routing algorithms, congestion control, internetworking, Quality Control, Internetworking, The Network Layer in the Internet, IP packet, IP addresses, IPv6. **[No of Hrs.: 10]**

UNIT - IV

Transport Layer: Design Issue, connection management, TCP window management, User Datagram Protocol, Transmission Control Protocol, Performance Issues. **Application Layer:** DNS, Electronic Mail, WWW, MUTIMEDIA. **Network Security**: Cryptography and Compression Techniques**.** **[No of Hrs.: 10]**

TEXT BOOKS:

1. Forouzan, "Data Communication and Networking", TMH, 4th Edition.
2. A.S. Tanenbaum, "Computer Networks", PHI, 4th Edition.
3. W. Stallings, "Data and Computer Communication", Macmillan Press.
4. Comer, "Computer Networks and Internet", PHI.
5. Comer, "Internetworking with TCP/IP", PHI.

REFERNCES:

1. W. Stallings, "Data and Computer Communication", McMillan.
2. J. Martin, "Computer Network and Distributed Data Processing", PHI.
3. W. Stallings, "Local Networks", McMillan.
4. M.Schwertz, "Computer Communication Network Design and Analysis", PHI.
5. S. Keshav, "An Engineering Approach to Computer Networking, Pearson", 2001.

Code No.: MCA 209 **L T C**
Paper: C# Programming **3 1 4**

INSTRUCTIONS TO PAPER SETTERS:

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

OBJECTIVE: *In this course student will become familiar with an with C# language. This course will help to develop real life projects.*

PREREQUISITES:

- Basic Programming Language

UNIT - I

The CLR and .NET Framework: Understand the motivation behind the .NET platform, Common Language Infrastructure (CLI). Know the role of the Common Type System (CTS), the Common Language Specification (CLS) and the Common Language Runtime (CLR), Understand the assembly, metadata, namespace, type distinction, Contrast single-file and multi-file assemblies, Know the role of the Common Intermediate Language (CIL), Platform independent .NET(Mono / Portable .NET distributions). **[No. of Hrs.: 08]**

UNIT - II

Evolution of C# Language: Language Fundamentals, Reference and value Types, primitive types the Nullable and enum types, Classes and objects, Defining classes Creating objects, Using static members, Garbage Collector, Overloading Methods, Various Constructors. Encapsulating data, access modifiers, properties, indexers arrays and readonly fields. Handling errors and throwing exceptions The Root object class. Inheritance and polymorphism specialization and generalization, Abstract classes, nesting of classes. Structures. String and DateTime classes.
[No. of Hrs: 14]

UNIT - III

Event handling paradigm Delegates and events. Anonymous delegates and lambda expression FUNC and Action delegates.

Generics Collections Interfaces, overriding interface implementation. Explicit interface implementation. Collection, IEnumerable, IEnumerator, IList, IComparer and their Generic equivalent. Working with generic List, Stack, Dictionary and Queue.

Programming Window Forms Applications:. The notifies - subscribers paradigm for handling events. .NET framework for handling GUI events. Introduction to WPF and building an WPF application **[No. of Hrs: 10]**

UNIT - IV

Introducing LINQ and XML: XML A quick introduction. LINQ and C#. Defining and executing a Query. Implicitly typed local variables. Anonymous Types, Extension Methods and Lambda Expressions. Putting LINQ to work. LINQ to SQL Fundamentals of ADO.NET Updating retrieving and deleting data using LINQ to SQL. **[No. of Hrs: 10]**

TEXT BOOKS:

1. Jesse Liberty and Donald Xie , "Programming C# 3.0", O'REILLY.
2. J.G.R. Sathiaseelan, N Sasikaladevi, "Programming with C# .net", PHI, 2009.
3. Paul J. Deitel, Harvey Deitel, "C# 2008 for Programmers", Pearson, 3rd Ed., 2010.
4. Joseph Albahari and Ben Albhari, "C# 3.0/4.0 in NUTSHELL", O'REILLY.

REFERENCES:

1. Stephen C. Perry, Atul Kahate, Stephen Walther, Joseph Mayo, "Essential of .net and Related Technologies with a focus on C#, XML, ASP.net and ADO.net", Pearson, 2nd Ed. 2009.
2. Jon Skeet, "C# in Depth ", O'REILLY

Practical will be based on following:

1. Computer Graphics Lab **MCA 211**
2. Java Programming Lab **MCA 213**
3. C# Lab **MCA 215**

Code No. : MCA 261
Paper: General Proficiency – III*

It is suggested to have a fundamental course on Technical Paper Writing in this semester.

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

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

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