SCHEME OF EXAMINATION FOR MASTER OF COMPUTER SCIENCE (SOFTWARE) w.e.f. Academic Session 2015-16

Paper Code	Nomenclature of Paper	Exam Time (hrs.)	External Marks		Internal Marks		Total Marks
			Max	Pass	Max	Pass	
	FIRST SEMESTER						
MS-15-11	WEB ENGINEERING	3	80	32	20	8	100
MS-15-12	DATA STRUCTURES AND ALGORITHMS	3	80	32	20	8	100
MS-15-13	SOFTWARE ENGINEERING	3	80	32	20	8	100
MS-15-14	DISCRETE MATHEMATICAL STRUCTURES	3	80	32	20	8	100
MS-15-15	S/W LAB – I BASED ON MS-15-11	3	100	40			100
MS-15-16	S/W LAB – II BASED ON MS-15-12	3	100	40			100
MS-15-17	SEMINAR	1/2			50	20	50
	TOTAL		**520**		**130**		**650**
	SECOND SEMESTER						
MS-15-21	JAVA PROGRAMMING	3	80	32	20	8	100
MS-15-22	LINUX AND SHELL PROGRAMMING	3	80	32	20	8	100
MS-15-23	THEORY OF COMPUTATION	3	80	32	20	8	100
MS-15-24	COMPILER DESIGN	3	80	32	20	8	100
MS-15-25	S/W LAB – III BASED ON MS-15-21	3	100	40			100
MS-15-26	S/W LAB – IV BASED ON MS-15-22	3	100	40			100
MS-15-27	SEMINAR	1/2			50	20	50
	TOTAL		**520**		**130**		**650**
	THIRD SEMESTER						

MS-15-31	OBJECT ORIENTED ANALYSIS AND DESIGN USING UML	3	80	32	20	8	100
MS-15-32	ADVANCED DATABASE SYSTEMS	3	80	32	20	8	100
MS-15-33	COMPUTER NETWORKS	3	80	32	20	8	100
MS-15-34	ADVANCED OPERATING SYSTEMS	3	80	32	20	8	100
MS-15-35	S/W LAB – V BASED ON MS-15-31	3	100	40			100
MS-15-36	S/W LAB – VI BASED ON MS-15-32	3	100	40			100
MS-15-37	SEMINAR	1/2			50	20	50
	TOTAL		**520**		**130**		**650**
	FOURTH SEMESTER						
MS-15-41	ADVANCED WEB TECHNOLOGY	3	80	32	20	8	100
MS-15-42	COMPUTER GRAPHICS	3	80	32	20	8	100
MS-15-43	ADVANCED COMPUTER ARCHITECTURE	3	80	32	20	8	100
MS-15-44	ELECTIVE	3	80	32	20	8	100
MS-15-45	S/W LAB–VII BASED ON MS-15-41	3	100	40			100
MS-15-46	S/W LAB-VIII BASED ON MS-15-42	3	100	40			100
MS-15-47	SEMINAR	1/2			50	20	50
	TOTAL		**520**		**130**		**650**
	GRAND TOTAL		**2080**		**520**		**2600**

ELECTIVE: - I. CLOUD COMPUTING II. DIGITAL IMAGE PROCESSING

III. SOFT COMPUTING IV. SECURITY IN COMPUTING

V. DATA ANALYTICS

MS-15-11 WEB ENGINEERING

Maximum marks: 100 External: 80

Time: 3 hours Internal: 20

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of objective type/short-answer type questions covering the entire syllabus. In addition to question no. 1, the examiner is required to set eight more questions selecting two from each unit. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit. All questions will carry equal marks.

UNIT-I

Introduction to Web Engineering: Categories and Characteristics of Web Applications, Web Applications Vs Conventional Software, Need for an Engineering Approach.

Web Essentials: The Internet, Basic Internet Protocols, WWW, HTTP (Structure of Request and Response Messages), Web Browser and its functions, URL, Web Servers and their features, Defining Virtual Hosts, Secure Servers.

UNIT-II

MarkUp Languages: Introduction to HTML, Characteristics, XHTML Syntax and Semantics, Fundamental HTML Elements, Lists, Tables, Frames, Forms, XHTML Abstract Syntax, Creating HTML Pages.

Cascading Style Sheets: Features, Core Syntax, Types, Style Sheets and HTML, Style Rule Cascading and Inheritance, Text Properties, CSS Box Model, Normal Flow Box Layout, Positioning and other useful Style Properties.

UNIT-III

Client–Side Programming: Introduction to JavaScript, Perspective, Basic Syntax, Variables and Data types, Statements, Operators, Literals, Functions, Objects, Arrays, Built-in Objects, Debuggers.

Server-Side Programming: Servlet Architecture, Generating Dynamic Content, Servlet Life Cycle, Sessions, Cookies, URL Rewriting, Servlet Capabilities, Servlets and Concurrency.

UNIT-IV

XML: Relation between XML, HTML, SGML, Goals of XML, Structure and Syntax of XML, Well Formed XML, DTD and its Structure, Namespaces and Data Typing in XML, Transforming XML Documents, XPATH, Template based Transformations, Linking with XML, Displaying XML documents in Browsers.

Text Books:

1. Andrew King, “Website Optimization”, Shroff Publishers, India.
2. Achyut Godbole, “Web Technologies”, Tata McGraw Hill, India.

References Books:

1. Jeffrey C. Jackson, “Web Technologies”, Pearson Education, India.
2. Thomas Powell, “The Complete Reference HTML”, Tata McGraw Hill, India.
3. William Pardi, “XML in Action”, IT Professional, New York, USA.

MS-15-12 DATA STRUCTURES AND ALGORITHMS

Maximum marks: 100 External: 80

Time: 3 hours Internal: 20

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of objective type/short-answer type questions covering the entire syllabus. In addition to question no. 1, the examiner is required to set eight more questions selecting two from each unit. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit. All questions will carry equal marks.

UNIT-I

Introduction to Data Structures: Classification of Data Structures, Arrays, Stacks & Queues: Representation of Stacks, Stack Operations, Applications, Queues, Operations on Queues, Circular Queues, Dequeue, Priority Queues, Applications.

Linked Lists: Introduction, Types, Operations (Insertion, Deletion, Traversal, Searching, Sorting), Applications, Dynamic Memory Management, Implementation of Linked Representations.

UNIT-II

Trees: Definition, Representation of Trees, Types of Tree, Representation of Binary Trees, Binary Tree Traversals, Threaded Binary Trees, Binary Search Trees and Operations, Minimum Spanning Tree, AVL Trees, Heap, m-way Search Trees, B-Trees, B+ Trees, Applications, Advanced Trees: Introduction to 2-3 Tree, Red-black Tree, Splay Trees.

Graphs: Definitions and Basic Terminologies, Representation of Graphs, Graph Traversals, Shortest Path Problem, Applications.

UNIT-III

Introduction to Algorithms: Role of algorithms in computing, Complexity of algorithms, Analyzing algorithms, designing algorithms, asymptotic notations.

Divide and Conquer: Complexity of iterative programs and recursive programs, solving recurrence equations: back substitution method, recursion tree method, masters theorem.

Analysis of heap sort and quick sort; Counting sort, Radix sort, Bucket sort, Lower bounds for sorting.

Dynamic Programming (DP): Elements of DP, Matrix chain multiplication, Longest common subsequence, optimal binary search trees.

UNIT-IV

Greedy Techniques (GT): Elements of GT, Activity selection problem, Huffman codes, Knapsack Problem. Graph Algorithms: Single source shortest path: Analysis of Dijkstra's Algorithm, Limitations of Dijkstra's Algorithm, Negative weight cycle, Bellman-Ford algorithm. All Pairs Shortest Path: Relation of Shortest path and matrix multiplication, Analysis of Floyd Warshall algorithm. Maximum Flow: Flow network, Ford-Fulkerson method.

Computational complexity: Notion of Polynomial time algorithms, Complexity classes: P, NP, NP-Hard and NP-Complete, Polynomial time verification, Reducibility, NP-Completeness.

Text Books:

1. G.A.V Pai, "Data Structures and Algorithms", McGraw-Hill.
2. Cormen, Leiserson, Rivest, "Introduction to Algorithms", PHI India.

Reference Books:

1. Neapolitan R., "Foundations of Algorithms", Jones and Bartlett Learning.
2. Trembley, J.P. And Sorenson P.G., "An Introduction to Data Structures With Applications", McGraw- Hill.
3. Cooper A., "Computability Theory", Chapman and Hall/ CRC Press.
4. Robert Sedgewick, "Algorithms in C", Pearson Education India.
5. Seymour Lipschutz, "Data Structures", McGraw-Hill, Schaum's Outlines, New Delhi.

MS-15-13 SOFTWARE ENGINEERING

Maximum marks: 100 External: 80

Time: 3 hours Internal: 20

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of objective type/short-answer type questions covering the entire syllabus. In addition to question no. 1, the examiner is required to set eight more questions selecting two from each unit. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit. All questions will carry equal marks.

UNIT – I

Introduction: Software Crisis-problem and causes, Software Processes, Software life cycle models: Waterfall, Prototype, Evolutionary and Spiral models, Overview of Quality Standards like ISO 9001, SEI-CMM, CMMI, PCMM, Six Sigma.

Software Metrics: Size Metrics like LOC, Token Count, Function Count, Design Metrics, Data Structure Metrics, Information Flow Metrics, cyclomatic complexity, Halstead Complexity measures.

UNIT – II

Software Project Planning: Cost estimation, static, Single and multivariate models, COCOMO model, Putnam Resource Allocation Model, Risk management, project scheduling, personnel planning, team structure, Software configuration management, quality assurance, project monitoring.

Software Requirement Analysis and Specifications: Structured Analysis, Data Flow Diagrams, Data Dictionaries, Entity-Relationship diagrams, Software Requirement and Specifications, Behavioral and non-behavioral requirements.

UNIT – III

Software Design: Design fundamentals, problem partitioning and abstraction, design methodology, Cohesion & Coupling, Function Oriented Design and User Interface Design.

Coding: Programming style, structured programming.

Software reliability: Metric and specification, Musa and JM reliability model, fault avoidance and tolerance, exception handling, defensive programming.

UNIT – IV

Software Testing: Functional testing: Boundary Value Analysis, Equivalence class testing, Cause effect graphing, Structural testing: Control flow based and data flow based testing, loop testing, mutation testing, load, stress and performance testing, software testing strategies: unit testing, integration testing, System testing, Alpha and Beta testing, debugging.
Static Testing: Formal Technical Reviews, Walk Through, Code Inspection.

Software Maintenance: Types of Maintenance, Maintenance Process, Maintenance characteristics, Reverse Engineering, Software Re-engineering.

Text Books

1. Pressman R. S., “Software Engineering – A practitioner’s approach”, Tata McGraw Hill.
2. Sommerville, “Software Engineering”, Pearson Education.

Reference Books:

1. Pfleeger, “Software Engineering: Theory and Practice”, Pearson Education.
2. P. Jalote, “An Integrated approach to Software Engineering”, Narosa Publications.
3. R. Fairley, “Software Engineering Concepts”, Tata McGraw Hill.
4. James Peter, W. Pedrycz, “Software Engineering”, Wiley India Pvt. Ltd.

MS-15-14 DISCRETE MATHEMATICAL STRUCTURES

Maximum marks: 100 External: 80

Time: 3 hours Internal: 20

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of objective type/short-answer type questions covering the entire syllabus. In addition to question no. 1, the examiner is required to set eight more questions selecting two from each unit. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit. All questions will carry equal marks.

UNIT – I

Set Theory: Basic Set Theory, Operations on Sets, Algebra of sets, Venn Diagrams.
Relations: Binary Relations, Complement of relations, Inverse of relations, Composite relations, Properties, Equivalence, Partial Order and Total order relations.

Functions: Functions on Set, Domain, Co-domain, Representation of Functions, Types, Identity and Inverse Functions, Composition of Functions.

UNIT –II

Propositional Calculus: Propositional logic, Equivalences, Predicates , Quantifiers, Nested Quantifiers, Rules of Inference, Normal Forms, Proofs: Methods, Strategy.

Counting: Pigeonhole Principle, Inclusion-Exclusion Principle, Permutations and Combinations, Binomial Coefficients, Counting Principles.

UNIT –III

Advanced Counting Techniques: Recurrence Relations, Solving Recurrence Relations, Divide and Conquer Algorithms and Recurrence Relations, Solution of Recurrence Relations by the method of Generating Function.. Latices and boolean algebra: Lattices, Hasse Diagram, Principle of Duality, Types of Lattices, Special Lattices, Boolean Expression, Equivalent circuits, Dual, Normal Forms.

UNIT –IV

Graphs: Introduction, Terminology, Types of Graphs, Representation of Graphs, Paths and Circuits, Cut-set and Cut - Vertices, Graph Isomorphism, Homomorphism, Connectivity, Bipartite Graphs, Subgraphs, Operations on Graphs, Euler and Hamiltonian

Graphs, Shortest Path Problem, Planar & Dual Graphs, Coloring.

Tree: Tree Notations, Properties of tree, Types of Tree,Operations, Minimum Spanning Tree (MST).

Text Books:

1. Kenneth G. Rosen, “Discrete Mathematics And Its Applications”, Tata McGraw Hill.
2. Koshy T., “Discrete Mathematics with Applications”, Elsevier India.

Reference Books:

1. Eric Gosett, “Discrete Mathematics with proof”, Wiley India Pvt. Ltd.
2. Seymour Lipshutz, “Schaum Outlines of Discrete Mathematics”, Tata McGraw-Hill.
3. Kenneth Ross, “Discrete Mathematics”, Pearson India.

MS-15-21 JAVA PROGRAMMING

Maximum marks: 100 External: 80

Time: 3 hours Internal: 20

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of objective type/short-answer type questions covering the entire syllabus. In addition to question no. 1, the examiner is required to set eight more questions selecting two from each unit. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit. All questions will carry equal marks.

UNIT – I

Introduction to Java: Importance and features of Java, Java virtual machine, Byte code, JDK, Keywords, constants, variables and Data Types, Operators and Expressions, Decision Making, Branching and Looping, jump statements: break, continue, return. 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.

UNIT – II

Packages and interfaces, Exception Handling: Fundamentals exception types, uncaught exceptions, throw exception, built in exception, creating your own exceptions, Multithreaded Programming: Fundamentals, Java thread model: synchronization, messaging, thread classes, Runnable interface, inter thread Communication, suspending, resuming and stopping threads.

UNIT – III

I/O Streams: String and String Buffer classes, Wrapper classes: Basics types, using super, Multilevel hierarchy abstract and final classes. Input/Output Programming: Basics, Streams, Byte and Character Stream, predefined streams, Reading and writing from console and files.

UNIT –IV

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. Beans: Introduction to Java Beans and Swings.

Text Books:

1. Patrick Naughton and Herbertz Schildt, “Java-2 The complete Reference”, McGraw Hill.

Reference Books:

1. E Balaguruswamy, **“**Programming with Java”, Tata McGraw-Hill.
2. Horstmann, “Computing Concepts with Java 2 Essentials”, Wiley India Pvt. Ltd.
3. Decker & Hirshfield, “Programming.Java”, Edition 3, Vikas Publication House.

MS-15-22 LINUX AND SHELL PROGRAMMING

Maximum marks: 100 External: 80

Time: 3 hours Internal: 20

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of objective type/short-answer type questions covering the entire syllabus. In addition to question no. 1, the examiner is required to set eight more questions selecting two from each unit. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit. All questions will carry equal marks.

UNIT – I

Introduction to Unix/Linux: Evolution of Unix/Linux, Unix/Linux distributions, Linux/Unix operating system, Linux/Unix architecture, Features of Linux/Unix, Interfacing with Unix/Linux system.

Commands in Unix/Linux: General-Purpose commands, File oriented commands, directory oriented commands, Communication-oriented commands, process oriented commands and other commonly used commands.

UNIT – II

Regular expressions & Filters in Linux: Regular expressions and their use, Simple filters viz. more, wc, diff, sort, uniq, grep, sed, etc.

Linux/Unix file system: Linux/Unix files, inodes and structure and file system, file system components, standard file system, file system types, file system mounting and unmounting.

UNIT – III

Processes in Linux : starting and stopping processes, initialization Processes, mechanism of process creation, job control - at, batch, cron, time, Signal handling.

System Calls: creat, open, close, read, write, iseek, link, unlink, stat, fstat, umask, chmod, exec, fork, wait, system.

UNIT – IV

Basic system administration in Linux/Unix.

Shell Programming: vi editor, shell variables, I/O in shell, control structures, loops, subprograms, command line programming, creating shell scripts.

Text Books:

1. Sumitabha Das, Your Unix - The Ultimate Guide, Tata McGraw-Hill.
2. Mark G.Sobell, A Practical Guide to Linux Commands, Editors, and Shell Programming, Pearson Education.

Reference Books:

1. Yashwant Kanetkar, Unix & Shell programming – BPB Publications.
2. Richard Petersen, The Complete Reference – Linux, McGraw-Hill.
3. M.G.Venkateshmurthy, Introduction to Unix & Shell Programming, Pearson Education.
4. Stephen Prata, Advanced UNIX-A programmer's Guide, SAMS Publication.

MS-15-23 THEORY OF COMPUTATION

Maximum marks: 100 External: 80

Time: 3 hours Internal: 20

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of objective type/short-answer type questions covering the entire syllabus. In addition to question no. 1, the examiner is required to set eight more questions selecting two from each unit. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit. All questions will carry equal marks.

Unit – I

Computability and Non-computability and examples of non-computable problems, Russel's paradox, Finite State System, Extended Transition Function, Designing of DFA and NDFA, Finite Automata with E-Transitions, Equivalence of DFA and NFA with proof, Regular Expression, Laws of Regular Expressions, Kleene's Theorem 1 and 2, Properties and Limitations of FSM, FSM with Output: Moore and Mealy Machines, Arden's Theorem with proof, Closure Properties of Regular Sets, Application of Pumping Lemma, Myhill-Nerode Theorem, Minimization of FA.

Unit – II

Grammar: Definition, Chomsky Classification of Grammars, Construction of Context Free Grammar, Derivation, Parse Trees, Ambiguity, Removal of Ambiguity, Simplification of Context Free Grammar, CNF and GNF, Closure properties of CFL, Pumping Lemma for CFL.

Pushdown Automaton: Introduction, Types of PDA, Designing of PDA's, Conversion from PDA to CFG and vice-versa, Applications, Parsing: Early's, Cook-Kasami-Young, Tomito's, top-down and bottom-up methods

Unit – III

Linear Bounded Automata (LBA), Turing machines, variants of TMs, Restricted TMs, TMs and Computers. Recursive and recursively- enumerable languages and Properties.

Decidability: Post's correspondence problem, Rice's theorem, decidability of membership, emptiness and equivalence problems of languages. Random Access Machines, Decidable languages, decidable problems, The halting problem, Diagonalization method, Undecidable problems for Regular expressions, Turing machines and other undecidable problems.

Unit – IV

Reducibility: The Set NP and Polynomial Verifiability, Polynomial-Time Reductions and NP-Completeness, The Cook-Levin Theorem, Some Other NP-Complete Problems, Reduction, mapping reducibility.

Computational Complexity: Primitive recursive functions, computable functions, examples, Recursion theorem. Tractable and Intractable problems, Theory of Optimization.

Text Books

1. John C. Martin, "Introduction To Languages and Theory of Computation", McGraw Hill.

2. Peter Linz, An introduction to formal language & automata, Jones & Bartlete publications.

Reference Books:

1. Hopcroft,J.E.&Ullman,J.D. Formal languages and their relation to Automata, Pearson Education.
2. Lewis, H.R. & Papadimitrious, C.H. Elements of the theory of computation. PHI
3. Krithivasan K. & Rama R.,"Introduction to Formal Languages, Automata Theory and Computation", Pearson Education, 2009.
4. Michael Sipser, "Introduction to the Theory of Computation", Cengage Learning

MS-15-24 COMPILER DESIGN

Maximum marks: 100 External: 80

Time: 3 hours Internal: 20

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of objective type/short-answer type questions covering the entire syllabus. In addition to question no. 1, the examiner is required to set eight more questions selecting two from each unit. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit. All questions will carry equal marks.

Unit – I

Compilers and Translators, Need of Translators, Tools used for compilation, Structure and Phases of Compiler, Single-Pass and Multi-Pass Compilers, Bootstrapping, Compiler Construction Tools. Bootstrap compilers, Phases of Compilation process.

Lexical Analysis: Design of Lexical Analyzer, Finite Automata and Regular Expressions, Lex package on UNIX systems. Process of Lexical Analysis, Recognition of Regular Expressions.

Unit – II

Syntax-Directed Translation: Translation Schemes, Implementation of Syntax-Directed Translators, Intermediate code and its need, Postfix Notation, Parse Trees and Syntax Trees, Three-address code and its representations, Boolean Expressions, Flow of Control.

Symbol Table: Contents of Symbol Table, Data Structures used for symbol table, Representating scope information.

Run Time Storage Administration: Types of Storage Allocation Schemes, Implementation of Stack Allocation Scheme, Implementaion of Block Structured Languages, Storage Allocation in Block Structured Languages. Error Detection and Recovery: Errors, Lexical-Phase Errors, Syntactic Phase Errors, Semantic Errors.

Unit – III

Parsing Techniques: Top down & Bottom-up parsing, Shift Reduce parsing, Operator Precedence parsing, Predictive Parsers. Left Recursion and its removal, Recursive Descent parser, Automatic Construction of efficient Parsers: LR parsers, the Canonical Collection of LR(0) items, Constructing SLR parsing tables, Constructing Canonical LR parsing tables, Constructing LALR parsing tables, Using Ambiguous Grammars, an Automatic Parser Generator, Implementation of LR parsing tables, Constructing LALR sets of items. YACC package on UNIX systems.

Unit – IV

Intermediate Code Generation: Object programs, Issues in the design of a code generator, Intermediate languages, Quadruples, Generating intermediate code for declarative statement, Register Allocation and Assignment statement, Boolean expression, and case statement, peephole optimization.

Code Optimization: Principle sources of Optimization, optimization of basic blocks, Loop Optimizations, DAG Representation of Basic Blocks, Loop Invariant Computation, Reducible Flow Graphs, Global Data Flow Analysis, code improving transformation.

Text Books

1. Alfred V Aho, “Principles of Compiler Design, Narosa Publishing House.
2. Jean Paul Tremblay and Sorenson, “The Theory and Practice of Compiler Writing”, McGraw Hill.

Reference Books:

1. Dhamdhere D.M, System programming and operating system, McGraw Hill.
2. Beck L. Leland, System Software, Pearson Education.
3. Aho, Sethi, & Ullman, Compilers Principles, Techniques and Tools, Pearson Education.
4. Fischer, “Crafting a compiler in C”, Pearson Education.

MS-15-31 OBJECT ORIENTED ANALYSIS AND DESIGN USING UML

Maximum marks: 100 External: 80

Time: 3 hours Internal: 20

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of objective type/short-answer type questions covering the entire syllabus. In addition to question no. 1, the examiner is required to set eight more questions selecting two from each unit. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit. All questions will carry equal marks.

UNIT – I

UML: Principles of modeling, UML Things – Structural, Behavioral, Grouping, Annotational. Relationships in UML – Dependency, Association, Generalization, Realization. Overview of diagrams in UML – Class diagram, Object diagram, Use-Case diagram, Sequence diagram, Collaboration diagram, Statechart diagram, Activity diagram, Component diagram, Deployment diagram. UML Semantic Rules – Names, Scope, Visibility, Integrity, Execution. Mechanisms in the UML – Specifications, Adornments, Common Divisions, Extensibility Mechanisms.

UNIT – II

Modeling as a Design Technique: Abstraction, Encapsulation, Modularity, Hierarchy, Typing, Concurrency, Persistence of objects. Purpose of modeling,

Class Model – Object & Class, Links & Associations, Generalization & Inheritance, Association Ends - Multiplicity, Role names, Ordering, Qualification, Aggregation, Link attributes & Link class, Abstract class, Metadata, Constraints. Constructing class diagram.

UNIT – III

State Modeling: Event, State, Activity, Action, Transitions & Conditions, State diagrams, Nested state diagrams, signal generalization, concurrency, relationships between class and state models.

Interaction Modeling: use case models, use case relationships, sequence models, procedural sequence models, activity models, special constructs for activity models.

UNIT – IV

System Analysis & design: System development stages, system conception, analysis, domain class model, domain state model, iterating the analysis.
Application interaction model, application class model, application state model, adding operations
System Design: estimating performance, make a reuse plan, organize the system into subsystem, identifying concurrency, allocating subsystems to processors and tasks, management of data stores, handling global resources, choosing software control strategies, handling boundary conditions, setting trade-off priorities, selecting an architect style.

Class Design: bridging gap, realize use cases with operations, designing algorithms, design optimization, adjustment of inheritance, organize classes & associations.

Text Books:

1. Grady Booch, James Rumbaugh, Ivar Jacobson, “The Unified Modeling Language User Guide”, Pearson education.

2. M. Blaha, J. Rumbaugh, “Object-Oriented Modeling and Design with UML”, Pearson Education.

Reference Books:

1. J. Rumbaugh, M. Blaha, W. Premerlani, F. Eddy, W. Lorensen, “Object-Oriented Modeling and Design”, Prentice Hall of India-1998

2. Satzinger, Jackson, Burd, “Object-Oriented Analysis & Design with the Unified Process”, Thomson.

3. Grady Booch, “Object Oriented Analysis & Design”, Pearson Education.

MS-15-32 ADVANCED DATABASE SYSTEMS

Maximum marks: 100 External: 80

Time: 3 hours Internal: 20

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of objective type/short-answer type questions covering the entire syllabus. In addition to question no. 1, the examiner is required to set eight more questions selecting two from each unit. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit. All questions will carry equal marks.

UNIT – I

Database System Concepts and Architecture: Three - Schema Architecture and Data Independence, ER Diagrams, Naming conventions and Design Issues. Relational Model Constraints and Relational Database Schemas, EER model: Subclasses, Super classes, Inheritance, Specialization and Generalization, Constraints and characteristics of specialization and Generalization.

UNIT – II

Object Model: Overview of Object-Oriented concepts, Object identity, Object structure, Type constructors, Encapsulation of operations, Methods, and Persistence, Type hierarchies and Inheritance, Complex objects. Query Processing and Optimization: Using Heuristics in Query Optimization, Semantic Query Optimization, Database Tuning in Relational Systems.

UNIT – III

Databases for Advance Applications: Architecture for parallel database; Distributed database concepts, Data fragmentation, Replication, and allocation techniques, Overview of Client-Server Architecture, Active Database Concept and Triggers, Temporal Databases Concepts, Spatial and Multimedia Databases, Deductive Databases, XML Schema, Documents and Databases

UNIT – IV

Principles of Big Data: Ontologies and Semantics: Classifications, The Simplest of Ontologies, Ontologies, Classes with Multiple Parents, Choosing a Class Model. Data Integration and Software Interoperability Versioning and Compliance Issues, Stepwise Approach to Big Data Analysis, Failures and Legalities.

Text Books:

1. Elmasri and Navathe, “Fundamentals of Database Systems”, Pearson Education.

2. Jules J. Berman, “Principles of Big Data”, Elsevier India.

Reference Books:

1. Date C.J., “An Introduction to Database Systems”, Pearson Education.

2. Hector G.M., Ullman J.D., Widom J., “Database Systems: The Complete Book”, Pearson Education.

3. Silberschatz A., Korth H., Sudarshan S., “Database System Concepts”, McGraw Hill.

MS-15-33 COMPUTER NETWORKS

Maximum marks: 100 External: 80

Time: 3 hours Internal: 20

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of objective type/short-answer type questions covering the entire syllabus. In addition to question no. 1, the examiner is required to set eight more questions selecting two from each unit. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit. All questions will carry equal marks.

UNIT – I

Introduction to Computer Networks and its uses; Network categorization and Hardware; Topologies; Network Software: Protocols, Services, Network Architecture, Design issues for the layers, OSI Reference model, TCP/IP Reference model, Comparison of OSI and TCP/IP Models. Introduction to Example Networks: Internet, ISDN, X.25, Frame Relay, ATM.

UNIT – II

Data Communication Model, Digital and Analog data and signals, Asynchronous and Synchronous transmission; bit rate, baud, bandwidth, Transmission impairment; Channel Capacity; Guided Transmission Media; Wireless transmission; Satellite communication.

Switching; Multiplexing; Spread Spectrum; local loop; Modems and ADSL; Encoding: NRZ, NRZ-I, Manchester and Differential Manchester encoding; Internet over Cable; ADSL Versus Cable; The Mobile Telephone System;

UNIT – III

Data Link Layer Design issues; Framing, Error Detection and Correction; Flow Control: Sliding Window Protocols; Medium Access Control: Aloha, CSMA protocols, Collision free protocols, Limited Contention Protocols; Wavelength Division Multiple access protocol, Wireless LAN Protocol: MACA; High Speed LANs; Ethernet LAN, Fast Ethernet, Gigabit Ethernet; Binary Exponential Backoff algorithm; Token Ring and FDDI; Introduction to Wireless LANs;

UNIT – IV

Network Layer Design issues , Virtual Circuit and Datagram Subnet, Routing Algorithms: Optimality principle, Shortest path Routing, Flooding , Distance Vector Routing, Link State Routing, Hierarchical Routing, Broadcast and Multi Cast Routing, Routing for Mobile hosts, Congestion Control Algorithms: General Principals; Congestion control in Virtual – Circuit Subnets; Congestion Control in Datagram Subnets: Choke packets, Load Shedding; Random Early Detection, Jitter Control; Quality of Service: Over provisioning, Buffering, Traffic Shaping, Leaky bucket, token bucket, Resource Reservation, Admission Control, Packet Scheduling;

Text Books:

1. Andrew S. Tanenbaum, Computer Networks, PHI.

   Behrouz A Forouzan, Data Communications and Networking , 5th Edition- Tata Mc-Graw
2. Hill.

Reference Books:

1. Michael A. Gallo, William M. Hancock, Computer Communications and Networking Technologies – CENGAGE learning.
2. William Stallings, Data and Computer Communications, 5th Edition – PHI.

MS-15-34 ADVANCED OPERATING SYSTEMS

Maximum marks: 100 External: 80

Time: 3 hours Internal: 20

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of objective type/short-answer type questions covering the entire syllabus. In addition to question no. 1, the examiner is required to set eight more questions selecting two from each unit. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit. All questions will carry equal marks.

UNIT – I

Introduction to Distributed Systems, Hard ware concepts, Software concepts, Design issues.

Communication in Distributed Systems, Lay red Protocols, ATM networks, The Client – sever model, Remote Procedure call, Group communication.

UNIT – II

Synchronization in Distributed System, Clock Synchronization, Mutual Exclusion, Election algorithms, Atomic transactions, Deadlocks in Distributed Systems.

Process and processors in Distributed System threads, System Models, Processors allocation, Scheduling in Distributed System, Fault tolerance, Real time Distributed System.

UNIT – III

Distributed File Systems, Distributed File System Design, Distributed File System implementation, Trends in Distributed File System.

Distributed Shared Memory, Introduction, What is Shared memory?, Consistency models, Page based Distributed Shared memory, Shared – variable Distributed Shared memory, Object based Distributed Shared Memory.

UNIT – IV

REAL TIME AND MOBILE OPERATING SYSTEMS : Basic Model of Real Time Systems, Characteristics, Applications of Real Time Systems, Real Time Task Scheduling, Handling Resource Sharing, Mobile Operating Systems, Micro Kernel Design, Client Server Resource Access, Processes and Threads, Memory Management

Text Books:

1. Mukesh Singhal and Niranjan G. Shivaratri, "Advanced Concepts in Operating Systems - Distributed, Database, and Multiprocessor Operating Systems", Tata McGraw Hill, 2001.
2. Abraham Silberschatz; Peter Baer Galvin; Greg Gagne, "Operating System Concepts", Wiley India Pvt. Ltd.
3. Rajib Mall, "Real Time Systems: Theory and Practice", Pearson Education India, 2006
4. Distributed Operating Systems, Andrew S. Tanenbanm

MS-15-41 ADVANCED WEB TECHNOLOGY

Maximum marks: 100 External: 80

Time: 3 hours Internal: 20

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of objective type/short-answer type questions covering the entire syllabus. In addition to question no. 1, the examiner is required to set eight more questions selecting two from each unit. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit. All questions will carry equal marks.

UNIT – I

Introduction: Web Browsers, Caching, Downloading and Rendering, Persistent Connections, DNS caching and prefetching, CSS Expressions and performance, Buffering, Weblog

Optimization and Security: Parallel Downloading, Controlling caches, Content compression, Control size with minification, Optimizing images, Load balancers, Tuning MYSQL, Using query caching, Optimizing query execution and optimization, Marketing of Website: traffic generation, Newsletters; Security: SQL: query log, SQL injections.

UNIT – II

Search engines: Searching techniques used by search engines, keywords, advertisements, Search engine optimization for individual web pages: header entries, tags, selection of URL, alt tags, Search engine optimization for entire website: Hyperlinks and link structure, page rank of Google, click rate, residence time of website, frames, scripts, content management system, cookies, robots, Pitfalls in Optimization: optimization and testing, keyword density, doorway pages, duplicate contents, quick change of topics, broken links, poor readability, rigid layouts, navigation styles; tools for optimization: etracking, Google analytics, checklists.

UNIT – III

Introduction to JavaScript: Introduction, Obtaining user inputs, memory concepts, Operators, Control Structures, Looping constructs, break, continue statements, Programmer defined functions, Scoping rules, Recursion and iteration, Array declaration and allocation, passing arrays to function, Objects: String, Date, Boolean, Window, document; using cookies, Handling Events Using JavaScript.

UNIT – IV

Introduction to PHP: Installing and Configuring MySQL and PHP, Basic Security Guidelines, Variables, Data Types, Operators and Expressions, Constants, Flow Control Functions; Switching Flow, Loops, Code Blocks and Browser Output, Objects, Strings Processing, Form processing, Connecting to database, using cookies, dynamic contents.

Text Books:

1. Peter Smith, "Professional Website performance", Wiley India Pvt. Ltd.

2. Maro Fischer, " Website Boosting: Search Engine, Optimization, Usability, Website Marketing", Firewall Media, New Delhi.

3. Deitel H.M., Deitel P.J., "Internet & World wide Web: How to program", Pearson Education.

Reference Books:

1. Kogent Learning, "Web Technologies: HTML, JavaScript, PHP, Java, JSP, XML, AJAX – Black Book", Wiley India Pvt. Ltd.
2. Boronczyk, Naramore, "Beginning PHP, Apache, MySQL Web Development", Wiley India Pvt. Ltd.

MS-15-42 COMPUTER GRAPHICS

Maximum marks: 100 External: 80

Time: 3 hours Internal: 20

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of objective type/short-answer type questions covering the entire syllabus. In addition to question no. 1, the examiner is required to set eight more questions selecting two from each unit. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit. All questions will carry equal marks.

UNIT – I

Introduction to Computer Graphics and its applications, Components and working of Interactive Graphics; Video Display Devices: Raster scan and Random Scan displays, Display Processors; Resolution, Aspect Ratio, Refresh CRT, interlacing; Color CRT monitors, LookUp tables, Plasma Panel and LCD monitors, Interactive Input and Output Devices: keyboard, mouse, trackball, joystick, light pen, digitizers; image scanners, Touch Panels; Voice systems; printers, plotters; Graphics Software; Coordinate Representations;

UNIT – II

Drawing Geometry: Symmetrical and Simple DDA line drawing algorithm, Bresenham's line Algorithm; loading frame buffer; Symmetrical DDA for drawing circle, Polynomial method for circle drawing; circle drawing using polar coordinates, Bresenham's circle drawing; Generation of ellipse; parametric representation of cubic curves, drawing Bezier curves;

Filled-Area Primitives: Flood fill algorithm, Boundary fill algorithm, Scan-line polygon fill algorithm

UNIT – III

2-D Transformations: translation, rotation, scaling, matrix representations and homogeneous coordinates, composite transformations, general pivot point rotation, general fixed point scaling, Shearing; Reflection ; Reflection about an arbitrary line;

2-D Viewing: window, viewport; 2-D viewing transformation, zooming, panning; Clipping operations: point and line clipping, Cohen-Sutherland line clipping, mid-point subdivision line clipping, Liang-Barsky line clipping, Sutherland-Hodgman polygon clipping; Weiler-Atherton polygon Clipping

Pointing and positioning techniques; rubber band technique; dragging;

UNIT – IV

3-D Graphics: 3-D modeling of objects, 3D transformation matrices for translation, scaling and rotation, parallel projection: Orthographic and oblique projection; perspective projection; Hidden surface removal: Z-buffer, depth-sorting, area subdivision, BSP-Tree method; Ray casting;

Shading: Modelling light intensities, Gouraud shading, Phong shading;
Introduction to Animation, Tweening, Morphing, Fractals;

Text Books:

1. Donald Hearn, M. Pauline Baker, Computer Graphics, Pearson Education.
2. Foley etc., Computer Graphics Principles & Practice, Pearson Education.

Reference Books:

1. D.P. Mukherjee, Fundamentals of Computer Graphics and Multimedia, PHI.
2. Newmann & Sproull, Principles of Interactive Computer Graphics, McGraw Hill.
3. Rogers, Procedural Elements of Computer Graphics, McGraw Hill.
4. Anirban Mukhopadhyay, Arup Chattopadhyay, Introduction to Computer Graphics and Multimedia, Vikas Publications.
5. Zhigang Xiang, Roy Plastock, Computer Graphics, Tata McGraw Hill.
6. Apurva A. Desai, Computer Graphics, PHI.
7. Malay K. Pakhira, Computer Graphics, Multimedia and Animation, PHI

MS-15-43 ADVANCED COMPUTER ARCHITECTURE

Maximum marks: 100 External: 80

Time: 3 hours Internal: 20

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of objective type/short-answer type questions covering the entire syllabus. In addition to question no. 1, the examiner is required to set eight more questions selecting two from each unit. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit. All questions will carry equal marks.

UNIT – I

Computational Model: Basic computational models, evolution and interpretation of computer architecture, concept of computer architecture as a multilevel hierarchical framework. Classification of parallel architectures, Relationships between programming languages and parallel architectures

Parallel Processing:: Types and levels of parallelism, Instruction Level Parallel (ILP) processors, dependencies between instructions, principle and general structure of pipelines, performance measures of pipeline, pipelined processing of integer, Boolean, load and store instructions, VLIW architecture, Code Scheduling for ILP-Processors - Basic block scheduling, loop scheduling, global scheduling

UNIT – II

Superscalar Processors: Emergence of superscalar processors, Tasks of superscalar processing – parallel decoding, superscalar instruction issue, shelving, register renaming, parallel execution, preserving sequential consistency of instruction execution and exception processing, comparison of VLIW & superscalar processors Branch Handling: Branch problem, Approaches to branch handling – delayed branching, branch detection and prediction schemes, branch penalties and schemes to reduce them, multiway branches, guarded execution

UNIT – III

MIMD Architectures: Concepts of distributed and shared memory MIMD architectures, UMA, NUMA, CC-NUMA & COMA models, problems of scalable computers.

Direct Interconnection Networks: Linear array, ring, chordal rings, star, tree, 2D mesh, barrel shifter, hypercubes.

UNIT – IV

Dynamic interconnection networks: single shared buses, comparison of bandwidths of locked, pended & split transaction buses, arbiter logics, crossbar, multistage networks – omega, butterfly

Cache coherence problem, hardware based protocols – snoopy cache protocol, directory schemes, hierarchical cache coherence protocols, software based protocols.

Text Books:

1. Sima, Fountain, Kacsuk, Advanced Computer Architecture, Pearson Education, 2006.
2. D. A. Patterson and J. L. Hennessey, Computer Architecture – A Quantitative Approach, Fifth Edition, Morgan Kaufmann.

Reference Books:

1. Kai Hwang, Advanced Computer Architecture, McGraw Hill.
2. Nicholas Carter, Computer Architecture, McGraw Hill.
3. Harry F. Jordan, Gita Alaghband, Fundamentals of Parallel Processing, Pearson Education.

MS-15-44(I) CLOUD COMPUTING

Maximum marks: 100 External: 80

Time: 3 hours Internal: 20

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of objective type/short-answer type questions covering the entire syllabus. In addition to question no. 1, the examiner is required to set eight more questions selecting two from each unit. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit. All questions will carry equal marks.

UNIT – I

Cloud Computing: Definition, roots of clouds, characteristics, Cloud Architecture – public, private, hybrid, community, advantages & disadvantages of Cloud Computing.

Migrating into a Cloud: broad approaches, seven-step model to migrate

Virtualization: benefits & drawbacks of virtualization, virtualization types – operating system virtualization, platform virtualization, storage virtualization, network virtualization, application virtualization, virtualization technologies.

UNIT – II

Cloud Services & Platforms: Compute services, Storage services Database services, Application Services, Queuing services, E-mail services, Notification services, Media services, Content delivery services, Analytics services, Deployment & management services, Identity & access management services. Case studies of these services.

Federated & Multimedia Cloud Computing: architecture, features of federation types, federation scenarios, layers enhancement of federation; Multimedia Cloud.

UNIT – III

SLA Management in Cloud Computing: traditional approaches to SLA management, types of SLA, life cycle of SLA, SLA management in cloud, automated policy-based management.

Cloud Security: challenges, CSA cloud security architecture, authentication, authorization, identity & access management, data security, auditing.
Legal Issues in Cloud Computing: data privacy and security issues, cloud contracting models.

UNIT – IV

Developing for Cloud: Design considerations for cloud applications, reference architectures for cloud applications, cloud application design methodologies, data storage approaches

Python for Cloud: Python characteristics, data types & data structures, control flows, functions, modules, packages, file handling, date/time operations, classes, Python web application framework – Django.

Text Books

1. Arshdeep Bahga, Vijay Madisetti, Cloud Computing – A Hands-on Approach, University Press.
2. Saurabh Kumar, Cloud Computing, 2nd Edition, Wiley India Pvt. Ltd.
3. Rajkumar Buyya, James Broberg, Andrzej Goscinski, Cloud Computing – Principles and Paradigms, Wiley India Pvt. Ltd.

Reference Books

1. Barrie Sosinsky, Cloud Computing Bible, Wiley India Pvt. Ltd.
2. Michael Miller, Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online, Que Publishing.
3. Haley Beard, Cloud Computing Best Practices for Managing and Measuring Processes for On-demand Computing, Applications and Data Centers in the Cloud with SLAs, Emereo Pvt Limited.

MS-15-44(II) DIGITAL IMAGE PROCESSING

Maximum marks: 100 External: 80

Time: 3 hours Internal: 20

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of objective type/short-answer type questions covering the entire syllabus. In addition to question no. 1, the examiner is required to set eight more questions selecting two from each unit. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit. All questions will carry equal marks.

UNIT – I

Introduction to Digital Image Processing, Applications of digital image processing, Steps in digital image processing, Components of an Image Processing system, Image sampling and Quantization, Relationships between pixels.

Image Enhancement: Intensity transformations and spatial filtering, Point and Mask based techniques, Histogram processing, Fundamentals of spatial filtering, Smoothing and sharpening spatial filters.

UNIT – II

Filtering in frequency domain: Fourier Series and Transform, Discrete Fourier Transform, Frequency Domain Filtering Fundamentals, Homomorphic Filtering.

Color Image Processing**:** Color Fundamentals, Color characteristics, Color models, RGB, CYK, CMYK, HIS, YIQ models, Pseudo color image processing, full color image processing, color transformations, Smoothening and sharpening of images.

UNIT – III

Image Restoration: Model of Image Degradation/Restoration process, Noise models, Linear, Inverse filtering, Mean Square Error Restoration, Least Square Restoration.

Image Compression Fundamentals: Lossless and Lossy Compression, Basic Compression Methods: Huffman Coding, Run-Length Coding, LZW Coding, Arithmetic Coding, Bit-Plane Coding, Predictive Coding, Transform Coding, Wavelet Coding, Compression standards.

UNIT – IV

Image Segmentation: Fundamentals, Point, Line and Edge Detection, Thresholding, Region-Based Segmentation.

Image Representation: Boundary Representation, Chain Codes, Polygonal Approximations, Signatures, Boundary Descriptors, Simple Descriptors, Shape Numbers, Regional Descriptors, Topological Descriptors, Texture.

Text Book:

1. Gonzalez R.C., Woods R.E., “Digital Image Processing”, Pearson Education.
2. Vipula Singh, “Digital Image Processing with MATLAB and LABVIEW”, Elsevier India.

Reference Books:

1. Ganzalez R.C., “Digital Image Processing with MATLAB”, Tata McGraw Hill.
2. Sonka Milan, “Image Processing Analysis and Machine vision”, Cengage Learning.
3. William K. Pratt, “Digital Image Processing”, Wiley India Pvt. Ltd.
4. Chanda B., Majumder D. Dutta, “Digital Image Processing and Analysis”, PHI Learning.
5. Jain A.K., “Fundamental of Digital Image Processing”, PHI Learning.
6. Jayaraman S., Esakkirajan S., Veerakumar T., “Digital Image Processing”, Tata McGraw Hill.
7. Annadurai, “Digital Image Processing”, Pearson Education.

MS-15-44(III) SOFT COMPUTING

Maximum marks: 100 External: 80

Time: 3 hours Internal: 20

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of objective type/short-answer type questions covering the entire syllabus. In addition to question no. 1, the examiner is required to set eight more questions selecting two from each unit. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit. All questions will carry equal marks.

UNIT – I

Basic concepts of neuro-computing: Artificial Neural Network (ANN) and their biological roots and motivations, Mathematical Models of Neurons, ANN architecture, Learning rules, Learning Paradigms-Supervised, Unsupervised and reinforcement Learning, ANN training Algorithms-perceptions, Training rules, Delta, Back Propagation Algorithm, Multilayer Perceptron Model, Applications of Artificial Neural Networks, Competitive learning networks, Kohonen self organizing networks, Hebbian learning; Hopfield Networks, Associative Memories, The boltzman machine; Applications.

UNIT – II

Introduction to Fuzzy Logic: Classical and Fuzzy Sets: Overview of Classical Sets, Membership Function, Fuzzy rule generation. Operations on Fuzzy Sets: Compliment, Intersections, Unions, Combinations of Operations, Aggregation Operations. Fuzzy Arithmetic: Fuzzy Numbers, Linguistic Variables, Arithmetic Operations on Intervals & Numbers, Lattice of Fuzzy Numbers, Fuzzy Equations. Fuzzy Logic: Classical Logic.

UNIT – III

Genetic Algorithm (GA): Evolutionary computing, conditions for evolution, Simple Genetic Algorithm (SGA), different types of operators: Selection, Crossover, mutation and replacement, optimization problems and traditional optimization methods, differences between GA & traditional methods, Holland’s schemata theorem, encoding schemes.

UNIT – IV

Random Optimization, Simulated Annealing, Tabu Search, Ant Colony Optimization, Particle Swarm Optimization, Memetic Algorithms.

Text Books:

1. S. N. Sivanandam & S. N. Deepa, Principles of Soft Computing, Wiley - India.
2. Goldberg D. E., Genetic Algorithms in Search, Optimization, and Machine Learning, Pearson Education.

Reference Books:

1. Jang, Sun, Mizutani, Neuro-Fuzzy and Soft computing, Pearson Education.
2. Haykin, Neural networks: a comprehensive foundation, Pearson Education.
3. Mitchell M., An Introduction to Genetic Algorithms, Prentice-Hall, 1998.
4. Klir G.J. & Yuan B., Fuzzy Sets & Fuzzy Logic, PHI.

MS-15-44(IV) SECURITY IN COMPUTING

Maximum marks: 100 External: 80

Time: 3 hours Internal: 20

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of objective type/short-answer type questions covering the entire syllabus. In addition to question no. 1, the examiner is required to set eight more questions selecting two from each unit. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit. All questions will carry equal marks.

UNIT – I

Computer Security Concepts, Threats, Attacks and Assets, Security Functional Requirements, Security Architecture and Scope of Computer Security, Computer Security Trends, Computer Security Strategies. Program Security: Secure Program, Non-malicious Program Error, Viruses and other Malicious Code, Targeted Malicious Code, Control against Program Threats.

UNIT – II

Database Security: Database Management System, Relational Databases, Database Access Control, Inference, Security Requirements, Reliability and Integrity, Sensitive Data, Database Encryption.

Network Security: Threats in Network, Network Security Controls, Firewall- Need for firewall, Characteristics, Types of firewall, Firewall Basing, Intrusion Detection System- Types, Goals of IDS, IDS strengths and Limitations.

UNIT – III

Internet Security Protocols and Standards: Secure Socket Layer (SSL) and Transport Layer Security (TLS), IPv4 and IPv6 Security, Kerberos 672, X.509 678, Public Key Infrastructure.

Linux Security Model, File System Security, Linux Vulnerability, Linux System Hardening, Application Security.

Window Security Architecture, Windows Vulnerability, Windows Security Defense, Browser Defenses.

UNIT – IV

Physical Security Threats, Physical Security Prevention and Mitigation Measures, Recovery form Physical Security Breaches, Security Auditing Architecture, Security Audit Trail, Security Risk assessment, Security Controls or Safeguard, IT Security Plan, Cybercrime and Computer Crime, Intellectual Property, Privacy, Ethical Issues.

Reference Books:

1. Charles. P. Pfleeger & Shari Lawrence Pfleeger, Security in Computing, Pearson Education.
2. William Stalling, Lawrie Brown, “Computer Security Principles and Practice”, Pearson Education.

MS-15-44(V) DATA ANALYTICS

Maximum marks: 100 External: 80

Time: 3 hours Internal: 20

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of objective type/short-answer type questions covering the entire syllabus. In addition to question no. 1, the examiner is required to set eight more questions selecting two from each unit. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit. All questions will carry equal marks.

UNIT – I

Introduction: Need of Big Data, Big Data vs. conventional data, Big Data Platform, Statistical Concepts: Sampling Distributions - Re-Sampling - Statistical Inference - Prediction Error.

Introduction to Data Science & Analytics, Business value of Analytics and Data Science, Typical problems solved with data science, Analytics Modeling, Analytic Processes and Tools - Analysis vs Reporting - Modern Data Analytic Tools.

UNIT – II

DATA ANALYSIS : Regression Modeling - Multivariate Analysis - Bayesian Modeling - Inference and Bayesian Networks - Support Vector and Kernel Methods - Analysis of Time Series: Linear Systems Analysis - Nonlinear Dynamics - Rule Induction, Confidence Interval and Tests of Significance, Inferential statistics and predictive analytics, Chi square, Test of independence, ANOVA

UNIT – III

FRAMEWORKS AND VISUALIZATION : MapReduce – Hadoop, Hive, MapR – Sharding – NoSQL Databases - Casandra - Hadoop Distributed File Systems – Visualizations - Visual Data Analysis Techniques - Interaction Techniques; Systems and Analytics Applications - Analytics using Statistical packages-Approaches to modeling in Analytics – correlation, regression, decision trees, classification, association- Intelligence from unstructured information-Text analytics.

UNIT – IV

NoSQL Database concepts, Schema, Two Phase Commit, Sharding & Share Nothing Architecture, Feature Based, Key Based, Lookup Table Based, Cassandra Definition & Features, Distributed & Decentralized, Elastic Scalability, High Availability & Fault Tolerance, Tuneable Consistency, Strict & Casual Consistency, Column Orientation, Schema Free, High Performance.

Creating Keyspace and Column Family, Writing and Reading Data, Cluster, Wide Rows, Skinny Rows, Referential Integrity, Secondary Indexes, Sorting, DeNormalisation, Design Patterns, Materialized Views. CQL-Data Definition language(DDL) Statements, Data Manipulation Language (DML), Create and modify Users, User permission, Capture CQL output to a file, Import and export data, CQL scripts from within CQL, CQL Scripts from the command prompt.

REFERENCE BOOKS:

1. Michael Berthold, David J. Hand, “Intelligent Data Analysis”, Springer, 2007.
2. Anand Rajaraman and Jeffrey David Ullman, “Mining of Massive Datasets”, Cambridge University Press.
3. Bill Franks, “Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics”, Wiley India Pvt. Ltd.
4. Glenn J. Myatt, “Making Sense of Data”, Wiley India Pvt. Ltd.
5. Pete Warden, “Big Data Glossary”, O’Reilly, 2011.
6. Jiawei Han, MichelineKamber “Data Mining Concepts and Techniques”, Second Edition, Elsevier India, Reprinted 2008.
7. Big Data for Dummies by Judith Hurwitz, Alan Nugent, Dr. Fern Halper, Elsevier India.
8. Python for Data Analysis by Wes McKinney
9. Statistics by S. C. Gupta.