FACULTY OF ENGINEERING & TECHNOLOGY

SYLLABUS

FOR

M.Sc. (Computer Science)

(Semester: I – IV)

SESSION: 2016-17

GURU NANAK DEV UNIVERSITY, AMRITSAR

Eligibility :

Graduate with Computer Science / IT Computer Applications / Computer Maintenance as one of the elective subjects with 50% marks in aggregate.

OR

BCA/B.Sc. (IT)/ BIT or equivalent there to with atleast 50% marks in aggregate.

OR

Graduate with mathematics as an elective subject and Post-Graduate Diploma in Computer Applications / PG Diploma in Information Tech. / PG Diploma in E-Commerce & Internet Application or equivalent with 50% marks in the aggregate

Semester – I:

Paper	Subject	Marks
MCS–101	Advanced Data Structures	100
MCS–102	Advanced Computer Architecture	100
MCS–103	Network Design & Performance Analysis	100
MCS–104	Discrete Structures	100
MCS–105	Soft Computing	100
MCS–106P	Programming Laboratory - I (Based on Advanced Data Structures)	100
	Total Marks:	**600**

Semester – II:

Paper	Subject	Marks
MCS–201	Theory of Computation	100
MCS–202	Image Processing	100
MCS–203	Design & Analysis of Algorithms	100
MCS–204	Formal Specification & Verification	100
MCS–205	Distributed Database Systems	100
MCS–206P	Programming Laboratory – II (Design & Analysis of Algorithm and Distributed Database Systems)	100
	Total Marks:	**600**

Semester – III:

Paper	Subject	Marks
MCS–301	Advanced Software Engineering	100
MCS–302	System Software	100
MCS–303	Data Mining and Warehousing	100
MCS–304	Concept of Core and Advanced Java	100
MCS–305	Network Programming	100
MCS–306P	Programming Laboratory - III (Based on Advanced Java and Network Programming)	100
	Total Marks:	**600**

Semester – IV:

Paper	Subject	Marks
MCS-401	Advanced Web Technologies using ASP.NET	100
MCS–402	Microprocessor and Its Applications	100
MCS–403	Object Oriented Modeling, Analysis and Design	100
MCS–404P	Programming Laboratory – IV (Based on Advanced Web Technologies using ASP.NET)	100
MCS–405P	Project Work	200
	Total Marks:	**600**

M.Sc. (Computer Science) (Semester-I)

MCS-101: Advanced Data Structures

Time: 3 Hrs. **Max. Marks: 100**

Note:

(i) The paper setter is required to set eight questions in all and the candidates will be required to attempt any five questions out of these eight questions. All questions will carry equal marks.

(ii) The student can use only Non-programmable & Non-storage type calculator.

Review of algorithm analysis, Binary search trees, balanced binary search trees (red-black trees), B-trees, AVL Trees, 2-3 trees, 2-3-4 trees.

Binary heaps, heap operations, implementation and applications. Priority queue operations, and double-ended priority queues.

Binomial heaps, Fibonacci heaps. Data structures for disjoint sets.

Amortized analysis, string matching, and graph algorithms.

External data structures - external storage, external files, external sorting searching indexing files, external hashing.

References:

1. Alfred V. Aho, Jeffrey D. Uuman, John E. Hopcroft, “Data Structures and Algorithms” Addision Wesley, 1983.
2. Dinesh P. Mehta, I. Sartaj Sahni, “Handbook of Data Structures and Applications”, Chapman & Hall/CRC, 2004.
3. Sorenson and Trembley, “An Introduction to Data Structures with Applications, McGraw Hill, 2006 Edition.

MCS-102: Advanced Computer Architecture

Time: 3 Hrs. **Max. Marks: 100**

Note:

(i) The paper setter is required to set eight questions in all and the candidates will be required to attempt any five questions out of these eight questions. All questions will carry equal marks.

(ii) The student can use only Non-programmable & Non-storage type calculator.

Paradigms of Computing: Synchronous – Vector/Array, SIMD, Systolic

Asynchronous – MIMD, reduction Paradigm, Hardware taxanomy: Flynn's classification, Software taxanomy: Kung's taxanomy, SPMD.

Parallel Computing Models

Parallelism in Uniprocessor Systems: Trends in parallel processing, Basic Uniprocessor Architecture, Parallel Processing Mechanism.

Parallel Computer Structures: Pipeline Computers, Array Computers, Multiprocessor Systems Architectural Classification Schemes: Multiplicity of Instruction-Data Streams, Serial versus Parallel Processing, Parallelism versus Pipelining

Pipelining : An overlapped Parallelism, Principles of Linear Pipelining, Classification of Pipeline Processors, General Pipelines and Reservation Tables

References

Computer Architecture and Parallel Processing, Faye A. Briggs, McGraw-Hill International, 2007 Edition

Computer Systems Organization & Architecture, John d. Carpinelli, Addison Wesley, 2007 Edition.

M.Sc. (Computer Science) (Semester-I)

MCS-103: Network Design & Performance Analysis

Time: 3 Hrs. **Max. Marks: 100**

Note:

(i) The paper setter is required to set eight questions in all and the candidates will be required to attempt any five questions out of these eight questions. All questions will carry equal marks.

(ii) The student can use only Non-programmable & Non-storage type calculator.

Requirements, planning, & choosing technology: System requirements, traffic sizing characteristics time & delay consideration.

Traffic engineering and capacity planning: Throughput calculation traffic characteristics &source models, traditional traffic engineering, queued data & packet switched traffic modeling, designing for peaks, delay or latency

Network performance modeling- Creating traffic matrix, design tools, components of design tools, types of design projects.

Technology Comparisons- Generic packet switching networks characteristics, private vs. public networking, Business aspects of packet, frame and cell switching services, High speed LAN protocols comparison, Application performance needs, Throughput, burstiness, response time and delay tolerance, selecting service provider, vendor, service levels etc.

Access Network Design- N/W design layers, Access N/W design, access n/w capacity, Backbone n/w design, Backbone segments, backbone capacity, topologies, Tuning the network, securing the network, Design for network security.

Documentation and network management- Documentation, network management, SNMP, RMON

References:

1. James D. McCabe, Network Analysis, Architecture and Design, 2nd Edition, Morgan Kaufman Series in Networking, 2007 Edition.
2. Youeu Zheng, Shakil Akhtar, Network for Computer Scientists and Engineers, Indian University, Oxford University Press, 2007 Edition.
3. A. Forouzan, Data Communications and Networking, Tata McGraw Hill, 2007 Edition.

MCS-104
Discrete Structures

Time: 3 Hrs. **Max. Marks: 100**

Note:

(i) The paper setter is required to set eight questions in all and the candidates will be required to attempt any five questions out of these eight questions. All questions will carry equal marks.

(ii) The student can use only Non-programmable & Non-storage type calculator.

Sets and Functions:
Sets, Relations, Functions, Pigeonhole principle, Inclusion - Exclusion Principle, Equivalence and Partial orderings, Elementary counting techniques, relation of partial order partitions, binary relations.

Graph Theory:
Definition, Walks, Paths, Directed and Undirected graphs, connected graphs, regular and bipartite graphs, Eulerian chains and cycles. Hamiltonian chains and cycles, planar graphs, Trees and rooted tree, Spanning trees, Chromatic number Connectivity and other graphical parameter application.

Combinatorial Mathematics:
Basic counting principles Permutations and combinations, Recurrence relations, generating Function, Application.

Rings and Boolean algebra: Rings Subrings morphism of rings ideals and quotient rings. Euclidean domains Integral domains and fields Boolean Algebra direct product morphisms Application of Boolean algebra in logic circuits and switching functions.

References:

1. Ehrig, H., Mahr, B. Fundamentals of Algebraic Specification I, EATCS Monographs on Theory. Comp. Sc. Vol. 6 spinger, Berlin 1985.
2. Gersting J. Mathematical Structures for Computer Science, W.H. Freman, New York, 1987.
3. Gibons, A. Algorithmic Graph theory Cambridge University Pres, 1985.
4. Knuth, D.E. The art of Computer Programming Vol. I: Fundamental Algorithms. 2nd ed. Reading, Mas, Adison Wesley 1973.
5. Kolman B. Busby R. Discrete Mathematical Structures for Computer Science, Prentice Hall Englewod Clifs. 1987.
6. Sahni, S. Concepts in Discrete Mathematics Fridley MN., Camelot Publ. Comp., 1981.
7. Schmidt G. Strohlein T. Relations Graphs Program, EATS Monograph on Theor. Comp. Sc. Vol. 29 Berlin Spinger 1993.
8. Wheler W. Universal Algebra for Computer Scientist EATCS Monographs on Theor. Comp. Sc. Vol. 25 Spinger-Verlag, Berlin 191.

MCS-105: Soft Computing

Time: 3 Hrs. **Max. Marks: 100**

Note:

(i) The paper setter is required to set eight questions in all and the candidates will be required to attempt any five questions out of these eight questions. All questions will carry equal marks.

(ii) The student can use only Non-programmable & Non-storage type calculator.

Neural Networks

Introduction to neural networks, working of an artificial neuron, linear seperability, perceptron, perceptron training algorithm, back propagation algorithm, adalines and madalines.

Supervised and unsupervised learning, counter-propagation networks, adoptive resonance theory, neocognitron and bidirectional associative memory.

Fuzzy Logic

Introduction to fuzzy logic and fuzzy sets, fuzzy relations, fuzzy graphs, fuzzy arithmetic and fuzzy if-then rules.

Applications of fuzzy logic, neuro-fuzzy systems and genetic algorithm.

Probabilistic Reasoning

Introduction to probability theory, conditional probability, Baye's theorem, fuzzy logic and its relationship with probability theory.

References:

1. Elements of artificial neural networks by Kishan Mehrotra, Chilkuri K. Mohan and Sanjay Ranka, 2007 Edition.
2. Fundamentals of artificial neural networks by Mohammad H. Hassoun, Prentice Hall of India, 2007 Edition.
2. Neural networks and fuzzy systems by Bart Kosko, Prentice Hall of India, 2007 Edition.
3. Fuzzy logic, intelligence, control and information by John Yen and Reza Langari, Pearson Education, 2007 Edition.
4. Probability and statistics by Murray R. Spiegel, John Schiller and R. Alu Srinivasan, Schaum's Outlines, Tata McGraw Hill Publishing Company Limited, 2007 Edition.

MCS-106 P
Programming Laboratory - I

Time: 3 Hrs. **Max. Marks: 100**

Programs based on Advanced Data Structures using C/C++

M.Sc. (Computer Science) (Semester-II)

MCS-201: Theory of Computation

Time: 3 Hrs. **Max. Marks: 100**

Note:

(i) The paper setter is required to set eight questions in all and the candidates will be required to attempt any five questions out of these eight questions. All questions will carry equal marks.

(ii) The student can use only Non-programmable & Non-storage type calculator.

Operations on Languages: Closure properties of Language Classes. Context Free Languages: The Chomsky Griebach Normal Forms. Linear Grammars and regular Languages. Regular Expressions Context Sensitive Languages; The Kuroda Normal Form, One sided Context Sensitive Grammars.

Unrestricted Languages: Normal form and Derivation Graph, Automata and their Languages: Finite Automata, Push down Automata and Turing Machines, The Equivalence of the Automata and the appropriate grammars.

Syntax Analysis: Formal Properties of LL(k) and L.R.(k) Grammars.

Derivation Languages: Rewriting Systems, Algebraic properties, Canonical Derivations, Context Sensitivity.

References:

1. G.E. Reevsz, Introduction to Formal Languages, McGraw Hill 1983.
2. M.H. Harrison, Formal Language Theory Wesley 1978.
3. Wolfman Theory and Applications of Cellular Automata, World Scientific, Singapore, 1986.
4. K.L.P. Mishra, N. Chandrasekaran, Theory of Computer Science (Automata, Languages and Computation), 2nd Edition, Prentice Hall of India, 2006.

M.Sc. (Computer Science) (Semester-II)

MCS-202: Image Processing

Time: 3 Hrs. **Max. Marks: 100**

Note:

(i) The paper setter is required to set eight questions in all and the candidates will be required to attempt any five questions out of these eight questions. All questions will carry equal marks.

(ii) The student can use only Non-programmable & Non-storage type calculator.

Background: Introduction to electronic systems for image transmission and storage, computer processing and recognition of pictorial data, overview of practical applications.

Fundamentals: Mathematical and perceptual preliminaries, human visual system model, image signal representation, imaging system specification building image quality, role of computers, image data formats.

Image Processing Techniques: Image enhancement, image restoration, image data compression and statistical pattern recognition.

Techniques of Colour Image Processing: Colour image signal representation, colour system transformations, extension of processing techniques to colour domain.

Applications of Image Processing: Picture data archival, machine vision, medical image processing.

References:

1. Pratt, W.K. Digital Image Processing, John Wiley, N.Y./1978.
2. Rosenfield, A and Kak, A.C., Picture processing, Academic Press N.Y., 1982.
3. Jain, A.K., Fundamentals of Digital Image Processing, Englewood Cliffs, Prentice Hall, 1989.
4. Chris Soloman, Stuart Gibson, Fundamentals of Digital Image Processing: A Practical Approach using MatLab, John Wiley and Sons, 2007.
5. Digital Image Processing by Gonzalez & Wood, Addison Wesley, 2000.

MCS-203: Design & Analysis of Algorithms

Time: 3 Hrs. **Max. Marks: 100**

Note:

(i) The paper setter is required to set eight questions in all and the candidates will be required to attempt any five questions out of these eight questions. All questions will carry equal marks.

(ii) The student can use only Non-programmable & Non-storage type calculator.

Introduction: Concept of Algorithm, Algorithm Specification, Performance Analysis (Time and space complexities), Asymptotic Notations.

Divide and Conquer: General Method, Binary Search, Finding the Maximum and Minimum, Quick Sort, Selection.

Greedy Method: General Method, Knapsack Problem,, Minimum Cost Spanning Trees (Prim's Algorithm, Kruskal's Algorithm) and Sibnngle-Source Shortest Path.

Dynamic Programming: General Single Method, Multistage Graphs, All Pairs Shortest Paths, Single-Source Shortest Paths, Optimal Binary Search Tress, 0/1 Knapsack and Travelling Saleman Problem.

Backtracking: General Method, 8-Queens Problem, Graph Coloring and Hamiltonian Cycles.

Search and Traversal Technique: Techniques for Binary Trees, Techniques for Graphs.

References:

1. V. Aho, J.E. Hopcroft, J.D. Ullman, Design and Analysis of Algorithms, Addison Wesley, 1976.
2. Horowitz, S. Sahni, Fundamentals of Computer Algorithms, Galgotia Publishers, 1984.
3. K. Mehlhorn, Data Structures and Algorithms, Vols. 1 and 2, Springer Verlag, 1984.
4. Purdom, Jr. and C. A. Brown, The Analysis of Algorithms, Holt Rinechart and Winston, 1985.
5. D. E. Kunth, The Art of Computer Programming, Vols. I and 3, Addison Wesley, 1975.
6. Anany Levitin, Introduction to the Design & Analysis of Algorithms, Addison, Wesley, 2002.

M.Sc. (Computer Science) (Semester-II)

MCS-204

Formal Specification & Verification

Time: 3 Hrs. **Max. Marks: 100**

Note:

(i) The paper setter is required to set eight questions in all and the candidates will be required to attempt any five questions out of these eight questions. All questions will carry equal marks.

(ii) The student can use only Non-programmable & Non-storage type calculator.

Specification of Sequential Programs: Pre-post conditions Partial and total correctness, First Order Logic, Abstract data types and data type refinement. Case study of specification languages.

Axiomatic System for first order logic. Proofs by mathematical induction. Hoare Logic, Techniques for proving non deterministic programs.

Dijkstra's weakest pre-condition semantics. Extension of Hoare Logic to deal with Languages involving advanced constructs like procedures with parameters, non-determinism, concurrency, communication and fairness.

Advanced Topics: Specification and verifications of reactive programs. Safety and Liveness Properties, Temporal Logic for specifying safety and liveness properties. Techniques for proving safety and liveness properties.

Computer-aided Verification: Deductive and model-theoretic approach. Automatic verification of finite state systems.

References:

1. Apt and Olderog, Program Verification, Springer Verlag, 1991.
2. S. Alagic and M. Arbib, Design of Well Structured and Correct Programs, Springer Verlag, 1978.
3. A. Pnueli and Z. Manna Temporal Logic of Reactive and Concurrent Systems, Springer Verlag, 1992.
4. D. Gries, Science of Programming, Narosa Pub.1985.
5. J. Loeckx and K. Siber, Found of Prog. Verification, John Wiley, 1984.

MCS-205
Distributed Database Systems

Time: 3 Hrs. **Max. Marks: 100**

Note:

(i) The paper setter is required to set eight questions in all and the candidates will be required to attempt any five questions out of these eight questions. All questions will carry equal marks.

(ii) The student can use only Non-programmable & Non-storage type calculator.

Introduction to distributed databases, comparison of distributed and centralized systems, DDBMS, global relations, fragment and physical image, types of schemas, methods of fragmentation of a relation, levels of transparency in a distributed system, integrity constraints.

Representation of database operation in form of a query, operation in form of a query, operations on a query, unary and binary tree in a query, converting a global query into fragment query, join and union operations involving a query, aggregate functions, and parametric queries.

Introduction to query optimization, estimation of profiles of algebraic operations, optimization graphs, reduction of relation using semi-join and join operation.

Properties and goals of transaction management, distributed transactions, recovery mechanism in case of transaction failures, log based recovery, check pointing, and communication and site failures in case of a transaction and methods to handle them, serializability and timestamp in distributed databases.

Introduction to distributed deadlocks, local and global wait for graphs, deadlock detection using centralized and hierarchical controllers, prevention of deadlocks, 2 and 3 phase locking and commitment protocols, reliability in commitment and locking protocols, reliability and concurrency control, reliability and removal of inconsistency.

Distributed database administration, authorization and protection in distributed databases, distributed database design, heterogeneous database system.

References:

1. Distributed Databases Principles and Systems by Stefano Ceri and Guiseppe Pelagatti, McGraw-Hill International Editions, 2004.
2. Distributed Database Systems by David Bell, Jame Grimson, Addison-Wesley, 1992.
3. M.Tamer Ozsu, Patrick Valdureiz, ‘Principles of Distributed Database Systems’ Second Edition, Prentice Hall, 2002.
4. Romez Elmasri, Shamkant B.Navathe, ‘Fundamentals of Database Systems’ Pearson Education, 2005.
5. Silberschatz, Korth, Sudershan “Database System Concepts” 4th Ed. McGraw Hill, 2006.
6. Connolly & Begg “Database Systems – A practical approach to Design, Implementation and Management, 3rd Ed. Pearson Education, 2005.

MCS-206 P
Programming Laboratory – II

Time: 3 Hrs. **Max. Marks: 100**

Implementations based on Design & Analysis of Algorithms and Distributed Database Systems.

MCS-301
Advanced Software Engineering

Time: 3 Hrs. **Max. Marks: 100**

Note:

(i) The paper setter is required to set eight questions in all and the candidates will be required to attempt any five questions out of these eight questions. All questions will carry equal marks.

(ii) The student can use only Non-programmable & Non-storage type calculator.

Software Project Management: Fundamentals of Software project planning , Conventional Software Management, Evolution of Software Economics, Improvement of Software Economics, Comparison of old and modern ways of Software Management.

Software Re-engineering: Introduction Re-engineering, Restructuring and Reverse Engineering, Re-engineering existing systems, Data Re-engineering and migration, Software Reuse and Re-engineering.

Object-Oriented (OO) Measurements: Introduction, Why metrics ?, Classification of OO metrics, Study of Design Metrics- method size, method internals, class size, class inheritance, Method inheritance, class intervals and class externals.

Object-Oriented Analysis and Design: What is Object-Oriented Design ?, Object, Abstraction, Collaboration among Objects, Polymorphism, Classes, specifying State, Specifying Behavior, Class Relationships, Grouping, Hiding.

Software Agents: Definition, Applications, Types and Classes, Multi-Agent systems, characteristics & Properties Agents.

References:

1. Software project management, Walker Royce, Pearson Education Inc.
2. Software Re-engineering, Robert S. Arnold IEEE Comp. Society.
3. Object Oriented Software Metrics, Lorenz and Kidd.
4. Object-Oriented Analysis and Design, Booch.

MCS-302
System Software

Time: 3 Hrs. **Max. Marks: 100**

Note:

(i) The paper setter is required to set eight questions in all and the candidates will be required to attempt any five questions out of these eight questions. All questions will carry equal marks.

(ii) The student can use only Non-programmable & Non-storage type calculator.

Introduction to System Software: Evolution of System Software, components of system software, Translators, loaders, interpreters, compiler, assemblers.

Assemblers: Overview of assembly process, design of one pass and two assemblers.

Macroprocessors: Macro definition and expansion, concatenation of macro parameters, generations of unique labels, conditional macro expansion, Recursive macro expansion.

Compilers: Phases of compilation process, logical analysis, parsing, storage management optimisation. Incremental compilers, cross compilers, P code compilers.

Loaders and Linkage Editors: Basic loader functions. Relocation, program linking, linkage, editors, dynamic linking bootstrap loaders.

Other System Software: Operating system, DBMS, text editors, Interactive debugging systems.

References:

1. Leland L. Beck: System Software, An introduction to system programming, Addison Wesley.
2. D.M. Dhamdhere: Introduction to System Software, Tata McGraw Hill.
3. D.M. Dhamdhere: System Software and Operating System, Tata McGraw Hill, 1992.
4. Madrich, Stuarte: Operating Systems, McGraw Hill, 1974.
5. Stern Nancy Assembler Language Programming for IBM and IBM compatible computers, John Wiley, 1991.

M.Sc. (Computer Science) (Semester-III)

MCS-303
Data Mining and Warehousing

Time: 3 Hrs. **Max. Marks: 100**

Note:

(i) The paper setter is required to set eight questions in all and the candidates will be required to attempt any five questions out of these eight questions. All questions will carry equal marks.

(ii) The student can use only Non-programmable & Non-storage type calculator.

Data Warehousing:
Concepts of Data Warehousing, Difference between operational database systems and Data warehousing, Need of a separate Data Warehouse. Multidimensional Data Model.

Data Warehousing Architecture:
Steps for Design and Construction of Data-Warehouses, Three-Tier Data Warehouse Architecture, Characteristics of Data Warehousing Data, Data Marts, Types of OLAP Servers: ROLAP, MOLAP, HOLAP; Difference between Online Transaction Processing and Online Analytical Processing

Data Warehouse Implementation:
Efficient Computation of Data Cubes, Indexing OLAP Data, Efficient Processing of OLAP Queries, Metadata Repository, Data Warehouse Back-End Tools and Utilities

Data Mining
Basic Concepts;
Data Mining Techniques: Predictive Modeling, Database Segmentation, Link Analysis, Deviation Detection in details.
Data Mining Query Languages, Applications and Trends in Data Mining.

References:

1. Han, Kamber *"Data Mining: Concepts and Techniques"* Morgan Kaufmann.
2. Romez Elmasri, Shamkant B.Navathe, *"Fundamentals of Database Systems"* Pearson Education.
3. Silberschatz, Korth, Sudershan *"Database System Concepts"* 4th Ed. McGraw Hill
4. Connolly & Begg *"Database Systems – A Practical Approach to Design, Implementation and Management*", 3rd Ed., Pearson Education.

MCS-304
Concept of Core and Advanced Java

Time: 3 Hrs. **Max. Marks: 100**

Note:

(i) The paper setter is required to set eight questions in all and the candidates will be required to attempt any five questions out of these eight questions. All questions will carry equal marks.

(ii) The student can use only Non-programmable & Non-storage type calculator.

Java Fundamentals: Features, Objects Oriented Basis, Java Virtual Machine

Character Set, Operators, Data Types, Control Structures

Classes, Inheritance, Polymorphism, Packages & Interfaces, Stream IO Classes, Exception Handling,

Multithreading: Java Thread model, Thread Priorities, Synchronization, Interthread communication, Suspending, resuming & stopping thread.

Applet: Applet basics, Applet architecture, Applet: Display, Repaint, Parameter Passing.

Telnet, FTP, Web Server and their implementation in Java.

References:

1. Complete Reference: Java, Herbet Schildt & Naughton, Tata Mc Graw, 5Th Edition, 2006.
2. Java Unleashed, Jane Jawoske, SAM5, Tech Me dia 2006.

MCS-305
Network Programming

Time: 3 Hrs. **Max. Marks: 100**

Note:

(i) The paper setter is required to set eight questions in all and the candidates will be required to attempt any five questions out of these eight questions. All questions will carry equal marks.

(ii) The student can use only Non-programmable & Non-storage type calculator.

Sockets and Socket Address structures, Concept of Zombies, Daemon Processes, Super servers, Concurrent versus Iterative servers, Protocol Independence, Error Handling : Wrapper functions, OSI Model, Unix standards.

TCP Connection establishment & Termination, Port Numbers and Concurrent Servers, Protocol Usage by common Internet Applications.

UDP Communication Semantics, UDP Echo Server, Echo Client working, Protocol Usage by Common Internet Applications.

Sockets Address Structures, Byte ordering & Manipulation Functions, TCP Socket System Calls, TCP Client-Server E.g., I/O Multiplexing, Signal Handling in Concurrent Servers.

Socket Options, Elementary Names Address Conversions, Ipv4 and Ipv6 Interoperability.

References:

1. Networking Programming, W. Richard Stevens, Pearson Education.
2. Advanced Programming in UNIX Environment, W. Richard Stevens, Pearson Education.

MCS-306 P
Programming Laboratory – III

Time: 3 Hrs. **Max. Marks: 100**

Programming Laboratory based on Advanced Java and Network Programming

MCS-401
Advanced Web Technologies using ASP.NET

Time: 3 Hrs. **Max. Marks: 100**

Note:

(i) The paper setter is required to set eight questions in all and the candidates will be required to attempt any five questions out of these eight questions. All questions will carry equal marks.

(ii) The student can use only Non-programmable & Non-storage type calculator.

Standard Controls: Display information, Accepting user input, Submitting form data, Displaying images, Using the panel control, Using the hyperlink control.

Validation Controls: Using the required field validator control, Using the range validator control using the compare validator control, Using the regular expression validator control, Using the custom validator control, Using the validation summary controls.

Rich Controls: Accepting file uploads, Displaying a calendar, Displaying advertisement, Displaying different page views, Displaying a wizard.

Designing Website with Master Pages: Creating master pages, Modifying master page content, Loading master page dynamically.

SQL Data Source Control: Creating database connections, Executing database commands, Using ASP.NET parameters with the SQL data source controls, Programmatically executing SQL data source commands, Cashing database data with the SQL data Source controls.

List Controls: Dropdown list control, Radio button list controls, list box controls, bulleted list controls, custom list controls.

Grid View Controls: Grid view control fundamentals, Using field with the grid view control, Working with grid view control events extending the grid view control.

Building Data Access Components with ADO.NET: Connected the data access, Disconnected data access, Executing a synchronous database commands, Building data base objects with the .NET framework.

Maintaining Application State: Using browser cookies, Using session state, Using profiles.

Caching Application Pages and Data: page output caching, partial page caching, data source caching, data caching, SQL cache dependences.

Reference:

ASP.NET 3.5: Stephen Walther, Pearson Education, 2005

M.Sc. (Computer Science) (Semester-IV)

MCS-402
Microprocessor and Its Applications

Time: 3 Hrs. **Max. Marks: 100**

Note:

(i) The paper setter is required to set eight questions in all and the candidates will be required to attempt any five questions out of these eight questions. All questions will carry equal marks.

(ii) The student can use only Non-programmable & Non-storage type calculator.

Introduction: Introduction to Microprocessor, General Architecture of Microcomputer System. Microprocessor Units, Input unit, Output unit, Memory unit and auxiliary storage unit.

Architecture of 8086/8088 Microprocessor: Description of various pins, configuring the 8086/8088 microprocessor for minimum and maximum mode systems, Internal architecture of the 8086/8088 microprocessor, system clock, Bus cycle, Instruction execution sequence.

Memory Interface of 8086/8088 Microprocessor: Address space and data organization, generating memory addresses hardware organization of memory address space, memory bus status code, memory control signals, read/write bus cycles, program and data
storage memory, dynamic RAM system.

Input/Output Interface of the 8086/8088 Microprocessor: I/O interface, I/O address space and data transfer, I/O instructions, I/O bus cycles, Output ports, 8255A Programmable Peripheral Interface (PPI), Serial communication interface (USART and UART) – the RS- 232 C interface.

Interrupt Interface of 8086/8088 Microprocessor, Types of Interrupt, Interrupt Vector Table (IVT).

References:

1. Walter Triebel: The 8086 Microprocessor – Architecture, Software and Interfacing Techniques, PHI, Delhi.
2. Walter Triebel: The 8088 Microprocessor – Architecture, Software and Interfacing Techniques, PHI, Delhi.
3. Douglas V. Hall: Microprocessors and Interfacing – Programming and Hardware, Tata McGraw Hill Publishing Company Ltd., New Delhi.
4. Peter Abel: IBM PC Assembly Language and Programming, PHI, Delhi.

MCS-403
Object Oriented Modeling, Analysis and Design

Time: 3 Hrs. **Max. Marks: 100**

Note:

(i) The paper setter is required to set eight questions in all and the candidates will be required to attempt any five questions out of these eight questions. All questions will carry equal marks.

(ii) The student can use only Non-programmable & Non-storage type calculator.

Object Orientation, OMT Methodology, Object and Class, Link and Association Generalization, Aggregation Multiple Inheritance, Packages,

Object Meta Modeling, Metadata and Metamodels, Functional Modeling Pseudocode with the Object navigation Notation, ONN Constructs, Combining ONN Constructs.

Analysis: Object Model, Data Dictionary, Dynamic Model, Functional Model.

System Design:- Devising an Architecture, Database Management Paradigm, Object Model, Elaborating the functional Model, Evaluating the Quality of Design Model.

Reference:

Object Oriented Modeling and Design By Michael Blaha, William Premerlani, and Prentice Hall.

MCS-404 P
Programming Laboratory – IV

Time: 3 Hrs. **Max. Marks: 100**

Programming Laboratory based on Advanced Web Technologies using ASP.NET

MCS–405P: Project Work

Time: 3 Hrs. **Max. Marks: 200**

1. Candidates have to submit only one hard copy and CD of documentation which shall be kept with the course supervisor/guide in the college only. Further, supervisor/guide OR principal of college shall forward two copies of DVD (Digital Versatile Disk) containing all the documentation files of the students (file name to be saved as Rollno_of_the_ student .pdf) to the concerned branch of the University. Covering letter (duly signed by the principal/Head of the college/institute) should contain the following information.
   Candidate name, Candidate Roll no, Project Title of the student and .pdf file name of his project documentation.
2. *The assignment shall be evaluated by a board of three examiner (two (02) External examiners and one (01) internal examiner) as approved by the BOS.*
3. The Project is to be submitted as per the common ordinances for P.G. courses under semester system.