UNIVERSITY OF KOTA

M.SC. COMPUTER SCIENCE EXAM. – 2019-20

Duration: 2 years

Eligibility: Graduation in any stream (Under 10+2+3 Scheme) with Minimum of 50% marks (45% for candidates belonging to the reserved category SC/ST/OBC)

Selection: Common Entrance Test conducted by University of Kota.

Scheme of Examination and Course of Study

1. Number of papers and the maximum marks for each paper/practical are shown in the syllabus for the subject concerned. It will be necessary for a candidate to pass in the theory part as well as in the practical part (wherever prescribed) of a subject/Paper separately.
2. The candidate shall be declared as pass in a semester examination. If he/she secures (i) at least 36% marks in the aggregate of all the papers prescribed for the examination and (ii) at least 36% marks in practical's/wherever prescribed at the examination, provided that if a candidate fails to secure at least 25% marks in each individual paper work. Wherever prescribed, he/she shall be deemed to have failed at the examination not withstanding his/her having obtained the minimum %age of marks required in the aggregate for the examination. Division shall be awarded at the end of the Final Examination taken together, as noted below:

   First Division 60% (On the aggregate marks taken)

   Second Division 48% (On the aggregate marks taken)
3. If a candidate clears any papers(s)/practical prescribed at the Examination after a continuous period of three years, then for the purpose of working out his division the minimum pass marks only viz. 25% (36% in the case of Practical) shall be taken into account in respect of such paper(s)/Practical(s)
4. A candidate failing at any one semester may be provisionally admitted to the next semester class. Provided that he/she passes in at least 50% papers.
5. A candidate may be allowed grace marks in only one theory papers up to the extent of 1% of the Total marks prescribed for that examination.

Theory:

I. **Assignments:** 40% of the internal assessment marks for each theory paper will be awarded on the basis of performance in the assignments regularly given to the students, and its records.

II. **Internal Examination:** 40% of the total Internal Assessment marks for each theory paper will be awarded on the basis of performance in written examination conducted by the faculty, one at the end of fourth month and another at the end of eighth month.

III. **Seminar/Oral examination:** 10% of the total internal assessment marks for each paper will be awarded on the basis of performance either in a seminar or internal viva-voce.

IV. **Overall performance:** 10% of the total internal assessment marks will be awarded for each paper on the basis of performance and conduct in the classroom.

TEACHING AND EXAMINATION SCHEME FOR
M.Sc. Computer Science – 2019-20
(Applicable for students admitted in Session 2019-20)

MCS Semester- I

S. No.	Subject Code	Name of Paper	Credit	Contact Hrs.			Internal Marks	External Marks	Total Marks
				L*	T*	P*			
1.	MCS 101	Introduction to Computer and PC Software	4	4	0	0	30	70	100
2.	MCS 102	Programming with C	4	4	0	0	30	70	100
3.	MCS 103	Discrete Mathematics	4	4	0	0	30	70	100
4.	MCS 104	Database Management Systems	4	4	0	0	30	70	100
5.	MCS 105	Lab on MS Office, PC Software &'C' Programming	9	0	0	12	00	100 (50+50)	100
		Total Credit	25	Total Marks					500

L* = Lecture T* = Tutorial P* = Practical

MCS Semester- II

S. No.	Subject Code	Name of Paper	Credit	Contact Hrs.			Internal Marks	External Marks	Total Marks
				L*	T*	P*			
1.	MCS 201	Operating Systems	4	4	0	0	30	70	100
2.	MCS 202	Programming with Java	4	4	0	0	30	70	100
3.	MCS 203	Data Structures	4	4	0	0	30	70	100
4.	MCS 204	System Software	4	4	0	0	30	70	100
5.	MCS 205	Lab on Java & OS	9	0	0	12	00	100 (50+50)	100
		Total Credit	25	Total Marks					500

L* = Lecture T* = Tutorial P* = Practical

MCS Semester- III

S. No.	Subject Code	Name of Paper	Credit	Contact Hrs.			Internal Marks	External Marks	Total Marks
				L*	T*	P*			
1.	MCS 301	Advanced Database Management System	4	4	0	0	30	70	100
2.	MCS 302	Software Engineering	4	4	0	0	30	70	100
3.	MCS 303	Web Technology	4	4	0	0	30	70	100
4.	MCS 304	Computer Networks	4	4	0	0	30	70	100
5.	MCS 305	Lab on Oracle & HTML	9	0	0	12	00	100 (50+50)	100
		Total Credit	25	Total Marks					500

L* = Lecture T* = Tutorial P* = Practical

MCS Semester- IV

S. No.	Subject Code	Name of Paper	Credit	Contact Hrs.			Internal Marks	External Marks	Total Marks
				L*	T*	P*			
1.	MCS 401	Elective – I	4	4	0	0	30	70	100
2.	MCS 402	Elective – II	4	4	0	0	30	70	100
3.	MCS 403	Major Project*	12	4	0	0	200	100	300
		Total Credit	20	Total Marks					500

L* = Lecture T* = Tutorial P* = Practical

List of Elective - I

401. 1. Client Server Computing
401. 2. Cloud Computing
401. 3. Real Time System

List of Elective - II

402. 1. Wireless Technology
402. 2. System Testing
402. 3. Natural Language Processing

Note: Student have to elect one elective paper from each list**.**

***** Major Project can be a group activity. Group of maximum 03 students can complete the project and it will be evaluated by 01 internal examiner and a panel of external examiners appointed by the university.

M.Sc. Computer Science

MCS 101 INTRODUCTION TO COMPUTER AND PC SOFTWARES

Duration : 3 Hrs. **Min marks: 36** **Max. Marks: 100**

Unit – I

Basic computer Organization : Arithmetic, logic, control and memory units, Internal representation of information, characters and codes, memory access, input and output units conversational devices, basic architecture of a CPU, Instruction format. Fetch and execute cycle.
Addressing modes. Control unit architecture.

Unit – II

I/O Architectures: Characteristics of simple I/O devices and their controllers. Transfer of information among I/O devices, CPU and memory. Program controlled and interrupt controlled information transfers. Introduction to DMA and I/O channels.

Memory Organization: Random access, serial access and direct access memories. Basic memory organization. Introductory concepts of virtual memory system.

Unit – III

Introduction to GUI based OS: concept of GUI, desktop, program, accessories, control panel, printers management, windows explorer, my documents, recycle bin, icons, shortcuts, files & folders, running applications under MS Windows.

Introduction to Word Processing software : creating, editing, viewing, formatting and Printing documents, tools, tables, mail merge, spell checker and features of Word processing software such as MS-Word, WordPad etc.

Unit – IV

Introduction to Worksheet : creating worksheets, editing, formatting work sheets, working with cell range, formulas and functions, graphs, data handing, format and tools.
Introduction to Presentation software: creating, editing slides, viewing slides, inserting slides and frames, tools and slide shows, OLE.

Unit – V

E-Governance: An Indian perspective, Digilocker, attendance.gov.in, mygov.in, Swachh Bharat Mission, E-Hospital, National Scholarship Portal, E-Sampark, UID, various modes of digital payment of Govt of India. Development of Super Computers in India "PARAM": History, Characteristics, Strength, Weakness and basic Architecture.

Text / Reference Books

1. Office 2000 for Everyone, Sanjay Saxena, Vikas Publications.
2. P.K. Sinha, Computer Fundamentals, BPB Publication.
3. First computer courses, Sanjay Saxena, Vikas Publications.
4. Fundamentals of IT, Leon and Leon, Vikas Publications.
5. Computer Architecture and Organization, Hayes, Tata McGraw Hill.
6. Computer Architecture and Logic Design, Thomas C, Tata McGraw Hill.

MCS 102 PROGRAMMING WITH C

Duration : 3 Hrs. **Min marks: 36** **Max. Marks: 100**

Unit I

Concept of good program, problems to programs, Introduction to 'C' Language, History of 'C', 'C' character Set, Identifiers and Keywords, Data types, Constants and Variables, declarations, statement, symbolic constants, Operators and expressions, precedence and order evaluating, formatted and unformatted input and output functions, All types of Control Statements.

Unit-II

Functions and Program Structure: Basics of functions, parameter passing, recursion, the C-pre-processor, and command line arguments.

Unit-III

Pointers and Arrays: concepts of Pointers, pointers and arrays, address arithmetic, pointers and functions, pointer to functions, Concept of dynamic memory allocation.

Unit-IV

Structures: Basics, structures and functions, array of structures, pointers to structures, self referential structures, table look up fields, union and typedef.

Unit-V

File Structure: Concept of Record, file operations: storing, creating, retrieving, updating, deleting, text and library files, File handling, file pointers, file accessing function, low level I/O, Error handling.

Text/Reference Books

1. The C Programming Language by Brian W. Kernighan, Dennis M. Ritchie, Prentice Hall Software Series, 2nd Edition.
2. Let us C by Y.Kanetkar, BPB Publications.
3. Mastering C by Vijay Prasad, TMH.
4. Programming with C, Balaguruswamy, Tata McGraw-Hill.
5. How to Solve it by Computers, Dromey, PHI.

MCS 103 : Discrete Mathematics

Duration : 3 Hrs. **Min marks: 36** **Max. Marks: 100**

UNIT - I

Number System, LCD & GCD, Fibonacci numbers, Sequences and series : AP, GP and HP, Sum of n terms, arithmetic–geometric- harmonic means between two numbers (excluding arithmetic- geometric series).
Logarithms: definition, Laws regarding product, quotient, exponent and change of base.

UNIT – II

SETS: Sets, subsets, equal sets, null set, universal set, finite & infinite sets, open & closed sets etc., operations on sets, partition of sets, Cartesian product.

UNIT - III

RELATIONS AND FUNCTIONS : relation, properties of relations, equivalence relation, equivalence relation with partition , partial order relation, maximal and minimal points, pigeonhole principle, function, domain and range, onto, into and one-to-one functions, composite functions, inverse functions, introduction of algebraic, trigonometrically, logarithmic, exponential, hyperbolic functions, zeros of functions.

UNIT – IV

DIFFERENTIATION: Derivative, derivatives of sum, differences, product & quotients, derivatives of composite functions, logarithmic differentiation, mean value theorem, expansion of functions, (Maclaurin's & Taylor's.), indeterminate forms, L'Hospitals rule, maxima & minima, concavity, asymptote, singular points, curve tracing, successive differentiation & Leibnitz theorem.

UNIT - V

Basic concepts of Graph Theory: Vertices, edges, degree, paths, circuits, cycles, complete graphs and trees. Multi-graphs, weighted graphs and directed graphs, Adjacency matrix of a graphs. Connected and disconnected graphs.
Permutations (Simple and under restrictions), combinations (selections with and without replacement).

Text / Reference Books

1. C. L. Liu.: Elements of Discrete Mathematics, Tata Mc-Graw Hill.
2. Thomas, G.B. and R. L. Finney: Addison-Wesley , 9th edition.
3. Chandrika Prasad : Mathematics for Engineers, Prasad Mudranalaya, Allahabad, 19th edition
4. Shanti Narayan: Differential Calculus, S. Chand & Co.
5. Shanti Narayan: Integral Calculus, S. Chand & Co.

MCS 104: DATABASE MANAGEMENT SYSTEMS

Duration : 3 Hrs. **Min marks: 36** **Max. Marks: 100**

Unit – I

Introduction to Databases and Transactions, What is database system, purpose of database system, view of data, relational databases, database architecture, transaction management, Data Models , importance of data models, Basic building blocks, Business rules, The evolution of data models, Degrees of data abstraction.

Unit-II

Database Design , ER-Diagram, Database design and ER Model: overview, ER-Model, Constraints, weak entity sets, Codd's rules, Relational Schemas, Logical view of data, keys, integrity rules. Relational Database design: features of good relational database design, atomic domain and Normalization (1NF, 2NF, 3NF, BCNF).

Unit- III

Relational algebra: introduction, Selection and projection, set operations, renaming, Joins, Division, syntax, semantics. Operators, grouping and ungrouping, relational comparison. Calculus: Tuple relational calculus, Domain relational Calculus, calculus vs algebra, computational capabilities.

Unit- IV

Constraints, Views and SQL, types of constrains, Integrity constraints, Views: Introduction to views, data independence, security, updates on views, comparison between tables and views, SQL: data definition, aggregate function, Null Values, nested sub queries, Triggers.

Unit-V

Transaction management and Concurrency control ,Transaction management: ACID properties, serializability and concurrency control, Lock based concurrency control ,Time stamping methods, optimistic methods, database recovery management.

Text / Reference Books

1. Database Management Systems, Korth, Tata McGraw Hill.
2. Database Systems, Catherine Ricardo, Maxwell & Macmillan
3. SQL Complete Reference, Leon and Leon, Tata McGraw Hill.
4. Data Base System : Concept C.J. Date.
5. Data Base Management System, Navathe, Pearson Education Asia.

MCS 201: OPERATING SYSTEMS

Duration : 3 Hrs. **Min marks: 36 Max.** **Marks: 100**

Unit – I

Introduction to Operating Systems, Types of OS : time sharing, Single user and multiuser OS, parallel, distributed, real time systems, multi programming and multi processing systems, system calls, system programs, process concept, process scheduling, CPU scheduling.

Unit – II

Deadlock, characterization, methods for handling deadlocks, deadlock prevention, deadlock avoidance, memory management, paging, virtual memory, page replacement, algorithms.

Unit – III

Disk structure, disk scheduling, disk management, security, distributed system structure, Network operating systems, distributed operating systems, semaphores, monitors.

Unit – IV

Unix: History, programmer interface, file manipulation, process control, kernel, signals, file system, block and inodes, stream editor, character transliteration, VI editor.

Unit – V

Shell script variables, file name expansion, shell commands, looping and making decision.

Text / Reference Books

1. Advance Unix-A Programmer's Guide, Prata, SAMS
2. Operating System Concepts, Galvin, Addison Wesley
3. Operating System, Ritchie, BPB Publications.
4. Unix System V Primer, Prata, BPB Publications.

MCS 202: Programming with JAVA

Max Marks: 100 Min. Marks: 36

Unit – I

Introduction to Java, history, characteristics, Object oriented programming, data types, variables, arrays.

Unit – II

Control Statement: selection, iteration, jump statement, operators

Unit – III

Introduction to classes: class fundamentals, constructor, methods, stack class, inheritance, creating multilevel hierarchy, method over riding.

Unit – IV

Packages and interfaces, exception handling, multi- threaded programming. I/O applets.

Unit – V

Java Library, string handing, string comparison, string buffer, utility classes, vector stack dictionary, applet class, introduction to AWT, working with frame windows.

Text / Reference Books

1. Introduction to Java Programming, V. Daniel Liang, PHI.
2. The Java Handbook, Patrick Naught on, Tata McGraw Hill.
3. Introduction to Java programming, E Balagurusamy, PHI.
4. Programming Java, Decker & Hartsfield, Vikas Publications.

MCS 203- Data Structures

Duration : 3 Hrs. **Min marks: 36** **Max. Marks: 100**

Unit – I

Object Oriented Programming concepts, encapsulation, inheritance, polymorphism, class Object, complexity, analysis, Big O notation.

Unit – II

Constants, variables, Data types, Operators, expression, managing I/O, operators, decision making and branching, loop, arrays.

Unit – III

Strings, functions, structure, pointers, virtual functions, constructors, destructors, recursion.

Unit – IV

Single linked lists, doubly linked list, circular linked list, sparse table, stack, queue , dqueue, priority queue, graph, spanning tree, shortest path, hashing.

Unit – V

Tree, Binary Tree, Binary search tree, tree traversal, breadth – first, depth- first, insertion, deletion, AVL tree, B tree sorting, insertion, selection, bubble, decision tree, heap, shall, heap, quick, merge, sort, Radix sort.

Text / Reference Books

1. An Introduction to Data Structures with Applications, Tremblay & Sorensons, Tata Mcgraw hills publications.
2. Data structure and algorithms, Aho., Alfred V., Pearson Education.
3. Fundamentals of Data structure in C, Horowitz, Ellis, Galgotia publication.
4. Introduction to Data Structure and algorithms with C++ , Rowe, Glenn W., Prentice , Hall
5. Data structures using C and C++ , Langsun , Augenstein , Tenenbaum Aaron M, Prentice Hall

MCS 204: SYSTEM SOFTWARE

Duration : 3 Hrs. **Min marks: 36** **Max. Marks: 100**

Unit – I

Evolution of the components of a programming system, machine language, assembly language, design of assembler, statement of problem, format of databases, table processing searching, sorting.

Unit – II

Macro instructions, features of macro facility, algorithms, macro calls, instruction for definition, two pass and single pass algorithms.

Unit – III

Introduction to compiler, structure of compiler, role of the lexical analyzer, design of lexical analyzers, regular expressions, context free grammar, parse tree.

Unit – IV

Parsers, shift reduce, operators, pre-cascade, LR parser, constructing SLR grammar, parse tree.

Unit – V

Intermediate code, parse tree, syntax tree, tree address code, quadruples and triples, translation of assignment statements, symbol table.

Text / Reference Books

1. System Programming Donovan JJ.
2. System Software and Operating Systems, D M Dhamdhare

MCS 301: ADVANCED DATABASE

Duration : 3 Hrs. **Min marks: 36** **Max. Marks: 100**

Unit I

Introduction, Parallel database architecture, speedup, scale-up I/O parallelism, Inter-query and Intra-query parallelism, Inter-operational and Intra-operational parallelism, parallel query evaluation, Design of parallel systems, Implementation issues of Parallel query evaluation, Design of parallel systems, Comparison of Inter-query and Intra-query parallelism.

Unit II

Distributed Databases, Study of DDBMS architectures, Comparison of Homogeneous and Heterogeneous Databases, Analysis of Concurrency control in distributed databases, Implementation of Distributed query processing.
Distributed data storage, Distributed transactions, Commit protocols, Availability, Distributed query processing, Distributed data storage and transactions.

Unit III

Overview of client server architecture, Databases and web architecture, N-tier architecture, XML, Introduction, Structure of XML Data, XML Document Schema, Querying and Transformation: XQuery, XPath, XML validation, Web server, API to XML, Storage of XML Data, XML Applications: web services, Web based system, Implementation of XML validations, Use of web servers. XML and DTD implementation, Use of Web service like Amazon web service or Microsoft Azure.

Unit IV

Introduction to Decision Support, Data Warehousing, Creating and maintaining a warehouse. Introduction to Data warehouse and OLAP, Multidimensional data model, Data Warehouse architecture, OLAP and data cubes, Operations on cubes, Data preprocessing need for preprocessing, Multidimensional data model, OLAP and data cubes, Data warehousing Concepts, Study of Data preprocessing need for preprocessing, Simulating and maintaining a Warehouse, Analysis of Data preprocessing.

Unit V

Introduction to data mining , Data mining functionalities, clustering - k means algorithm, classification - decision tree, Baysian classifiers, Outlier analysis, association rules - apriori algorithm, Introduction to text mining, Implementing Clustering - k means algorithm, Analysis of Decision tree.

Text / Reference Books

1. Advanced Database Management System (MISL-DT) by Shilbhadra Dasgupta, Subhash K. Shinde Rini Chakrabarti, Publisher: Dreamtech Press.
2. Advanced Database Systems (The Morgan Kaufmann Series in Data Management Systems) by Carlo Zaniolo, Stefano Ceri, Christos Faloutsos, Richard T. Snodgrass, Publisher: Morgan Kaufmann.
3. Advanced Database Systems by Carlo Zaniolo, Publisher: Morgan Kaufmann.
4. Advanced Database Systems by Nabil R. Adam, Bharat K. Bhargava, Publisher: Springer-Verlag Berlin Heidelberg.
5. Advanced Database Technology and Design by Mario Piattini, Oscar Diaz, Publisher: Artech House, Inc. Norwood, MA, USA.

MCS 302: Software Engineering

Unit- I

Software engineering concepts, historical perspective, software evaluation, program design paradigms. Software project planning : identifying software scope, resources.

Unit- II

Analysis concept, analysis modeling (behavioral model, data model, functional model), analysis tools & techniques, risk management, project scheduling, tracking Cost estimation : project metrics, cost factors, cost estimation techniques (decomposition, empirical, automated estimation, delphi).

Unit- III

System design: Design concepts & principles (modularization abstraction, refinement, cohesion, coupling) design methods (structured design, object oriented design, real time system design), Implementation : modern programming language features & characteristics, language classes, coding style, efficiency.

Unit- IV

Software Quality Assurance : Quality factors and criteria, SQA metrics, SQA techniques. Verification and

Validation : software testing methods(WBT, BBT), software testing strategy (Unit testing, integration testing, validation system, testing).

Unit- V

Maintenance: Maintenance characteristics, Maintainability, software reuse, re-engineering, reverse engineering, CASE tools.

Text / Reference books

1. Software Engineering: A practitioners approach Roger S. Pressman, McGraw Hill, (Third and Forth Edition), 1992.
2. "An Integrated approach to software Engineering "Pankaj Jalote Narosa Emerging Web Technologies publishing House.
3. Software Engineering, H. Sommervill Ian , Addition Wesley Pub. Co.
4. Software Engineering Concepts" Fairley Richard , "McGraw Hill, 1985.
5. Software Engineering: An object Oriented Perspective by Braude, E.J., Willey, 2001.

MCS 303: WEB TECHNOLOGY

Duration : 3 Hrs. **Min marks: 36** **Max. Marks: 100**

Unit – I

Internet current state, hardware and software requirement, ISP an internet account, web home page, URL, browser, security on web, searching tools, search engines, FTP, Gopher, Telnet, emails, TFTP.

Unit – II

Web browser architecture, webpage and multimedia, static, dynamic and active web page Simple network management protocol, hypertext transfer protocol.

Unit – III

HTML, Creating web page, Methods of Linking publishing, HTML, Text formatting and alignment, Font Control, Arranging text in lists, Images on a web page, Background and Color Control Interactive Layout with Frames.

Unit – IV

JavaScript, comment types, JavaScript reserved words, identifiers, events, primitive data types, escape sequences, data type conversion functions and methods, operators, control structures and statements objects, applet fundamentals, applet life cycle, local and remote applet applications, tags, creating and passing parameters to applets, exception handling.

Unit – V

Java beans, beans architecture, AWT components, advantage of Java beans serialization, JDBC, class and methods, API components, JDBC components, driver, connectivity to database, processing result and interfaces, RMI, comparison of distributed and non-distributed Java programs, interfaces, RMI architecture layer, ODBC, CORBA, CORBA services and products, CGI, structure of CGI.

Text / Reference Books

1. HTML 4 Unleashed, Darnell, BPB Publication.
2. Practical HTML 4, Philips, PHI.
3. JavaScript, Don Gosselin, Vikas Publication.
4. Principles of Web Design, Joel Sklar, Vikas Publication.
5. Enterprise Java Beans, O' Reilly.
6. JDBC Developers resources, PHI.
7. CGI Programming with Pert. Tec media.

MCS 304: COMPUTER NETWORKS

Duration : 3 Hrs. **Min marks: 36** **Max. Marks: 100**

Unit – 1

Introduction to computer networks, advantage of networking, network architecture & strategies. Data transmission concept and terminology (data and signal), Analog and digital data transmission, transmission impairments.

Unit – II

Transmission media : guided v/s unguided transmission media, multiplexing : TDM, FDM, SDM & WDM types of network : LAN (Star, Ethernet, BUS, token ring, FDDI), VLAN, MAN, WAN : Configuration, topology, network hardware (hub, bridge, switch, gateway and router).

Unit – III

Principles and purpose of layered approach, ISO-OSI model, concepts of the standards and protocols, protocol architecture, different layers and their functions of OSI model, TCP and IP protocols.

Unit – IV

Network technologies : ATM, Frame relay network, DSL, cable modem system, ISDN, SONET / SDH.

Unit – V

Network Management – SNMP, Internetworking, concept of DNS and URL, RMON. Issues related to network reliability and security, SSL, Firewalls, encryption / decryption and data compression, concept of cyber laws.

Text / Reference Books

1. Stallings William Data and Computer communication, Prentice Hall of India.
2. Tanenbaurm, A.S. Computer Networks.
3. Forouzan, A. Behforooz, Data communication and networking, McGraw hill.

MCS 401.1: Elective-I - Client Server Computing

Unit-I

Overview: definition, history, myths, transition to client server computing, database architectures, advantages and disadvantages of client server architecture. Components : client, server, network, role and services of client-server, selection of operating system as client & server, types of client & servers, connectivity, messaging and peer-to-peer communication, role of OSI layer in client server, TCP/IP networks.

Unit-II

Middle-ware: definition, role, 2 tier v/s 3 tiers, network file system, network operating system, API, RPC model & implementation, IPC.

Unit-III

Database Server: memory and process architecture, SQL and PL SQL. Client/Server Processing: transaction processing, remote processing, distributed processing.

Unit-IV

Developing and Managing C/S Applications: development tools, network management, backup and recovery, data integrity & security. Distributed objects: CORBA, COM, DOOM, OLE, Java-RMI, etc., ODBC & JDBC connectivity.

Unit-V

Data warehousing: operational data & analytical data, architecture. Distributed Computing: XML web services and services oriented architectures.

Text/Reference books

1. Amjad Umar, Distributed computing: a practical synthesis of networks, client-server systems, distributed
2. Applications and Open systems, PTR Prentice Hall, 1993.
3. Patrick Smith, Client/server computing, Sams, 1992.
4. Jeffrey D. Schank, Novell's guide to client-server applications and architecture, Novell Press, 1994.
5. Robert Orfali, Dan Harkey, Jeri Edwards, Client/server survival guide, John Wiley, 1999.

MCS 401.2: Elective-I - Cloud Computing

Duration : 3 Hrs. **Min marks: 36** **Max. Marks: 100**

Unit –I

Cloud Computing Fundamentals: Cloud Computing definition, Types of cloud, Cloud services: Benefits and challenges of cloud computing, Evolution of Cloud Computing , usage scenarios and Applications, Business models around Cloud – Major Players in Cloud Computing - Issues in Cloud - Eucalyptus -Nimbus - Open Nebula, CloudSim.

Unit –II

Types of Cloud services: Software as a Service - Platform as a Service – Infrastructure as a Service - Database as a Service - Monitoring as a Service – Communication as services. Service providers- Google App Engine, Amazon EC2, Microsoft Azure, Sales force. Introduction to MapReduce, GFS, HDFS, Hadoop Framework.

Unit –III

Collaborating on Calendars, Schedules and Task Management – Collaborating on Event Management, Contact Management, Project Management – Collaborating on Word Processing ,Databases – Storing and Sharing Files- Collaborating via Web-Based Communication Tools – Evaluating Web Mail Services – Collaborating via Social Networks – Collaborating via Blogs and Wikis.

Unit –IV

Need for Virtualization – Pros and cons of Virtualization – Types of Virtualization – System Vm, Process VM, Virtual Machine monitor – Virtual machine properties - Interpretation and binary translation, HLL VM - Hypervisors – Xen, KVM , VMWare, Virtual Box, Hyper-V.

Unit –V

Security in Clouds: Cloud security challenges – Software as a Service Security, Common Standards: The Open Cloud Consortium – The Distributed management Task Force – Standards for application Developers – Standards for Messaging – Standards for Security, End user access to cloud computing, Mobile Internet devices and the cloud.

Text/Reference books

1. Bloor R., Kanfman M., Halper F. Judith Hurwitz “Cloud Computing for Dummies” (Wiley India Edition),2010
2. John Rittinghouse & James Ransome, “Cloud Computing Implementation Management and Strategy”, CRC Press, 2010.
3. Antohy T Velte ,Cloud Computing : “A Practical Approach”, McGraw Hill,2009
4. Michael Miller, Cloud Computing: “Web-Based Applications That Change the Way You Work and Collaborate online”, Que Publishing, August 2008.
5. James E Smith, Ravi Nair, “Virtual Machines”, Morgan Kaufmann Publishers, 2006.

MCS 401.3: Elective-I -Real Time Systems

Duration : 3 Hrs. **Min marks: 36** **Max. Marks: 100**

Unit-I

Introduction to Real-time computing: Characterizing Real-time system & tasks; Performance measures of real time systems, estimation of program run time.

Unit-II

Real-time system design: Hardware requirement, system-development cycle, data transfer techniques, synchronous & asynchronous data communication, standard interfaces.

Unit-III

Task Assignment and Scheduling: Priority scheduling, scheduling with fixed priority dynamic priority scheduling.

Unit-IV

Real-time programming languages & Tool: desired language characteristics, data typing, control structure, run time error handling, overloading & generics, run time support, Real-time databases, Real time communication algorithms.

Unit-V

Fault tolerance techniques: Causes of failure, fault types, fault detection, redundancy, integrated failure handling Reliability.

Evaluation techniques: Parameter values, reliability model for hardware redundancy, software error model, Clock synchronization.

Text/ Reference Books

1. C.M. Krishna & K.G. Shen, Real Time Systems, McGraw Hill, 1997.
2. P.D. Lawrence & K. Mauch, Real Time Microcomputer Design: An Introduction, McGraw Hill, 1988.
3. Mathai Joseph, Real Time systems : Specification, Verification & Analysis, Prentice Hall Inc., 1996.
4. Stuart Bennet, Real Time computer control, Prentice Hall Inc., 1988.
5. S. J. Young, Real time languages, John Willey & sons, 1982.

MCS 402.1: Elective-II – Wireless Technologies

Duration : 3 Hrs. **Min marks: 36** **Max. Marks: 100**

Unit-I

Introduction to wireless Communication System: Evolution, Generations of wireless communication, Wireless

transmission concepts: Frequencies, signals, Antennas. Comparison of wireless communication system: Land- Mobile technologies (GSM, CDMA) , Satellite, Personal Communication Systems.

Unit-II

Wireless MAC Protocols: S/F/T/CDMA, CSMA protocols, specialized MAC, Cellular Systems, Spread Spectrum: DSSS & FHSS; Wireless WAN (GSM: Mobile Service, GSM architecture, Radio Interface, Protocols, Localization & Calling, Handover & security)

Unit-III

Wireless LAN: IEEE 802.11 b/a/g: System architecture, Protocol architecture, MAC management; introduction to HIPERLAN. Concept of Bluetooth - IEEE 802.16.

Unit-IV

Mobile IP – Packet delivery – Registration process, Tunnelling and Encapsulation, Routing protocols, DHCP, Unicast & multicast Communication, Wireless TCP- Indirect, Snooping & mobile TCP; Introduction to wireless PAN.

Unit-V

Ad-Hoc Networks- (Infrastructure and Ad-Hoc networks) Routing algorithms, Support for mobility WAP, WAP architecture, Transport Security – Transaction protocol, Session protocol, Introduction to pervasive computing- Applications, Devices, Software.

Text/Reference Books

1. Jochen Schiller. Mobile Communications, Pearson Education
2. Stojmenovic Ivan, HandBook of Wireless Networks and Mobile Computing, John Wiley & Sons
3. Theodore S. Rappaport, Wireless Communications: Principles and Practice, Second Edition, Prentice Hall. 2002.
4. Chander Dhawan, Mobile Computing- A System Integrator's Approach, McGraw-Hill
5. Wireless Communication and Networking – Willam Stallings, PHI, 2003.6. Ad-hoc Wireless Networks- Architecture and Protocols by C. Siva ram Murthy, B.S. Manoj, Pearson Education, 2nd Edition, 2005.

MCS 402.2: Elective-II - System Testing

Unit- I

Introduction to Software testing, Error fault, Failure, Incident, Test cases, Test Plan, Software testing processes overview, Incremental testing approach, Test outlines, Limitation of Testing.

Unit- II

Functional Testing: Boundary value analysis, Equivalence Class Testing, Decision Table Based Testing and cause effect – graphing Technique.

Unit- III

Structural Testing: Path Testing, Cyclomatic Complexity, Graph metrics, Data Flow testing, Mutation Testing. Object Oriented Testing: Issues, Class Testing, GUI Testing, Object Oriented Integration and System testing, Testing Web Based Systems

Unit- IV

Reducing the number of test cases: Prioritization guidelines, Priority category scheme, Risk analysis, Regression Testing, slice based Testing,

Testing activities: Unit Testing, Levels of Testing, and Integration Testing, System Testing, Debugging, Domain Testing.

Unit – V

Testing Tools: Static Testing Tools, Dynamic testing Tools, and characteristics of Modern Tools.

Building and applying standards to test Documentation: Configuration management, Reviews, Industry Standards – ISO 9001, CMM for Software, IEEE standards.

Text:

1. William Perry, "Effective Methods for Software Testing", John Wiley & Sons, New York, 1995.
2. Cem Kaner, Jack Falk, Nguyen Quoc, "Testing Computer Software", Second Edition, Van Nostrand Reinhold, New York, 1993
3. Boris Beizer, "Software Testing Techniques", Second Volume, Second Edition, Van Nostrand Reinhold, New York, 1990
4. Louise Tamres, "Software Testing", Pearson Education Asia, 2002

References:

1. Roger S. Pressman, "Software Engineering – A Practitioner's Approach", Fifth Edition, McGraw-Hill International Edition, New Delhi, 2001.
2. Boris Beizer, "Software System Testing and Quality Assurance," Van Nostrand Reinhold, New York, 1984.

MCS 402.3: Elective-II – Natural Language Processing

Duration : 3 Hrs. **Min marks: 36** **Max. Marks: 100**

Unit-I

Introduction to Natural Language, Understanding Language as a knowledge base process, Basic linguistics.

Morphology-Types and Parsing, N-gram Model, Maximum Likelihood Estimation, Smoothing techniques on N-gram Model, Words and Word Classes, POS Tagging.

Unit-II

Grammar and Parsing – Top-Down Parsing, Bottom-up Parsing, Dependency Grammar, Parsing Indian Language.

Unit-III

Meaning Representation, First Order Predicate Calculus, Elements of FOPC, Semantics and FOPC, Syntax Driven Semantic Analysis, Principal of Compositionally, Semantic Augmentation of CFG Rules, Robust Semantic Analysis.

Unit-IV

Introduction to Semantic Grammar, Structure of word, Thematic Roles, Word Sense DisambiguationSelection Restrictions, Machine Learning Approaches, Dictionary Based Approaches.

Unit-V

Context and World Knowledge: Knowledge Representation and Reasoning. Local Discourse context and Reference. Discourse structure and understanding using World Knowledge, Language Learning and Concept Learning.

Text/Reference Books

1. James Allen, Natural Language Understanding, Pearson Education India.
2. Rich & Knight, Artificial Intelligence, Tata Mc Graw Hill Pub.
3. Dan W. Patterson, Artificial Intelligence: A Modern approach, Pearson Education, India
4. Russell Norwig, Artificial Intelligence: A Modern approach, Pearson Education, India.
5. Speech and Language Processing by Jurafsky and Mrtin, Prentice Hall, 2000