Annexure to Notification No.F(Pres-Syllabi.PG-CBCS)Acad/KU/14 dated 15-05-2014
Syllabus for MCA 1st to 6th semester

Choice based Credit System (CBCS)
Scheme and course structure for
MCA 2nd semester effective from academic session 2014 and onwards

Semester-II						
Course Code	Course name	Paper category	Hours / Week			Credits
			L	T	P	
MCA14201CR	Data and File Structures	Core	3	0	0	3
MCA14202CR	Numerical and Statistical Computing	Core	3	0	0	3
MCA14203CR	Lab for Data and File Structures	Core	0	0	6	3
MCA14204CR	Lab for Numerical and Statistical Computing	Core	0	0	6	3
MCA14205EA	Advance Computer Architecture	Elective (Allied)	3	0	0	3
MCA14206EA	Data Communication	Elective (Allied)	3	0	0	3
MCA14207EA	Operating Systems	Elective (Allied)	3	0	0	3
MCA14208EA	Optimization Techniques	Elective (Allied)	3	0	0	3
MCA14209EA	Management Information System	Elective (Allied)	3	0	0	3
MCA14210EO	Open elective (To be selected from outside department)	Elective (Open)	4	0	0	4
MCA14211EO	Open elective (Offered for students from outside department)	Elective (Open)	4	0	0	4
24 Credits=31 Contact Hours						

2nd Semester
Core:
MCA14201CR: Data and File Structures
MCA14202CR: Numerical and Statistical Computing
MCA14203CR: Lab for Data Structure
MCA14204CR: Lab for Numerical and Statistical Computing
Electives: (any 4)
MCA14205EA: Advance Computer Architecture
MCA14206EA: Data Communication
MCA14207EA: Operating Systems
MCA14208EA: Optimization Techniques
MCA14209EA: Management Information System
MCA14210EO: Open elective (To be selected from outside department)

Course No.: MCA14201CR
Course Title: Data & File Structures

Unit I
Introduction: Introduction to Data Structure; Primitive and non-primitive data structure; Linear and non-linear data structure; Recursion Function and its examples (Tower of Hanoi etc.). Sparse array and its implementation. String Manipulation; Markov theorem and its applications;

Unit II
Singly and Doubly-Linked Lists, Circular Linked List, their implementation and comparison. Stacks and Queues: their array based and Linked List based Implementation. Applications of Stack (Evaluation of expressions, their conversions).

Unit III
Searching: Sequential and Binary Search , Concept of Hash Functions, Hash-tables and Hashing with Chaining. Sorting Techniques: Insertion Sort, Selection Sort, Quick Sort, Heap Sort. Introduction to external sort

Unit IV
Binary Trees, Binary Search Trees: Searching, Insertion and Deletion of nodes.
Height Balance and Concept of AVL Trees. Concept and purpose of B-Trees.
Graphs: Definition, Terminology and representation using Adjacency Matrix and linked list. Shortest Path Algorithms and their implementation. Graph Traversals: BFS and DFS Algorithms and their Implementations.

Text Book:
Tenenbaun M., "Data Structures Using C And C++", Pearson Education.
Tremblay and Sorenson: "An Introduction to Data Structures with Applications" McGraw Hill, New Delhi, 1976

Reference Books:
Horowitz and Sahni: "Fundamentals of Data Structures" Golgotia Publication, 2001.

Course No. MCA14202CR
Course Title: Numerical and Statistical Computing

UNIT I

Introduction. Requirements for computer-oriented solutions to numerical problems. Approximations & Errors – Types of Programming Errors, Computer & Arithmetic Errors, Accuracy and Precision, Round Off and Truncation Errors. Propagation of Error.
Algorithms to Compute Roots of Equation – Methods of Tabulation or Brute Force Method, Method of Bisection, Secant Method, Newton-Raphson Method, Method for False Position. Implementations of these methods.

UNIT II

Algorithms to Solve Linear Algebraic Equations : Gauss Elimination, Gauss Jordan, Gauss Seidel, L.U. Decomposition, Lagrange Interpolated Polynomial, Newton Divided Differences Interpolating Polynomial. Implementation of these methods.

UNIT III

Algorithms to solve Ordinary Differential Equations – Euler Method and Modification. The trapezoidal Rule, Simpson's Rule. R-K Method. Implementation of these methods.

UNIT IV

Standard Deviation, Correlation, Regression Analysis, Algorithms for Curve Fitting straight line: Least Square Approximation. Concept of Hypothesis, Statistical Tests: Chi-Square Test, Student t-Test, f-Test.

REFERENCE BOOKS:

S.C.Chapra & R.P.Canale: "Numerical methods for Engineering". Tata McGraw Hill.
Krishenmurty and Sen : "Numerical Algorithms"
V. Rajaraman "Computer oriented numerical methods." Prentice Hall of India.
McCalla, Thomas Richard: "Introduction to Numerical Methods and FORTRAN Programming", John Wiley & Sons, Inc.
Grewal, B. S.: "Higher Engineering Mathematics", Hindustan Offset Problems Series.
"SCHAUM'S Solved Problems Series".
Sharma, K. D.:"Programming in Fortran".
Jain, M. K., Iyengav, S. R. K., Jain, R. K.: "Numerical Methods for Scientific and Engineering Computation"+, Wiley Eastern Ltd, New Delhi.

Course No. MCA14203CR Lab for Data and File Structures

Course No. MCA14204CR Lab for Numerical and Statistical Computing

Course No: MCA14205EA
Course Title: Advanced Computer Architecture

Unit I

Computational Models : Introduction , Interpretation of the concept of a computational model , Relationship between , the concepts of computational model , programming language and architecture , Basic Computational models , The Von , Neumann computational model ,Key concepts related to computational models , Granularity , typing . The concept of computer architecture : Evolution and interpretation of the concept of Computer Architecture at different levels of abstraction. The concept of computer architecture at multilevel hierarchical framework. Extensions , Description of Computer Architectures.

Unit II

Introduction to Parallel Processing , : Basic Concepts about program , process, thread , process and treads in languages , concurrent and parallel execution , concurrent and parallel programming languages, Types and levels of Parallelism , Classification of Parallel architectures , Basic Parallel Techniques , Relationship between languages and parallel architectures . Introduction to Instruction level Parallel Processors , Evolution and overview , dependencies , instruction scheduling , preserving sequential consistency , the speedup potential of ILP Processing , Pipelined Processors , Basic Concepts , Design space of Pipelines , Pipelined instruction Processing , Pipelined execution of integer and Boolean instructions , Pipelined Processing of loads and stores.

Unit III

VLIW , Basic Principles ,Overview of Proposed and Commercial VLIW , Superscalar processing , introduction , parallel decoding , superscalar instruction issue , shelving , register renaming , parallel execution , preserving the sequential consistency of instruction execution and exception processing ,Implementation of superscalar CISC processor using a superscalar RISC core. Processing of control transfer instructions. The branch problem ,basic approaches . Guarded exception. Code Scheduling of ILP.

Unit IV

Introduction to data-[parallel architectures , connectivity , SIMD Architecture , fine and coarse grained SIMD architectures , Associative and neural architectures ,Data Parallel pipelined and systolic architectures , vector architectures , Introduction to MIMD architectures , Multi threaded architectures , Distributed Memory MIMD architecture , Shared memory MIMD architectures..

Text Book : Advanced Computer Architecture DEZSO SIMA , TERENCE Mountain , PETER KACSUK , Pearson Education, Fifth Indian reprint 2004.

Reference Books :

V.C. Hamacher. A.G. Vranesic and S. G. Zaky: “Computer Organization”, Tata McGraw Hill.
J.P. Hayes: “Computer Architecture and Organization”, McGraw Hill.
Morris Mano: “Computer System Architecture”, Pearson Education ,3/e.

Course No: MCA14206EA
Course Title : Data Communication

Unit I
Bandwidth and Channel Capacity. Quantifying Channel Capacity for noiseless channel(Nyquist Law) and noisy channel(Shannon's Law). Example of a digital telephone system to explain basic concepts of analog signals, digital signals, sampling. Data Rate versus Baud Rate. Nyquist Criterion for Sampling. Data transmission concepts. Characteristics of signals(amplitude, frequency, period,wavelength, Signal-to-Noise ratio). Key components in data communications systems. Simplified model. Local area network(LAN) concepts and characteristics.

Unit II
Wide area networks(WANs). WAN technologies (traditional packet and circuit switching, Frame Relay, ATM). ISDN(narrowband) concepts and services. Overview of the OSI model. Transmission media – factors affecting distance and data rate. Guided transmission media: Twisted-Pair, Co-axial Cable. Principles and advantages of optical networks. Types of optical fibers and lasers.

Unit III
Unguided transmission media: Terrestrial Microwave & Satellite Microwave systems and applications. Data encoding. Difference between modulation and encoding. NRZ-L, NRZ-I encoding. Multilevel Binary and Biphase Coding techniques and their implementations. ASK,FSK,PSK and QPSK. PCM concepts: sampling, quantization. Delta Modulation. Amplitude Modulation.

Unit IV
Reliable transmission of data: Asynchronous and Synchronous transmission. Error detection: Parity-based, CRC-based. FCS computation. Error control and recovery techniques. Concept of ARQ standard and its versions. Concept of Multiplexing. FDM. Synchronous and Statistical TDM.

Reference Books:
1.William Stallings, "Data and Computer Communications", Pearson Education
2.Andrew Tanenbaum, "Computer Networks", Pearson Education 4/e.
3. Ulysses Black, "Principles of Data Communications ", PHI.
4. Morley, Gelber, "The Emerging Digital Future", Addison-Wesley.

Course No: MCA14207EA
Course Title : Operating Systems

Unit I

Introduction to Distributed Systems: Goals – Advantages of distributed systems over centralized systems – disadvantages of distributed systems, Hardware & Software Concepts, loosely coupled systems, network operating systems, Network file systems, design Issues – transparency – Flexibility – performance – scalability.
Network and protocols: An introduction to Computer networking , Network technologies , LAN,WAN, Protocols, Technology case study, ATM, The Client – Server Model

Unit II

Remote Procedure Calling: Introduction , Features of RPC, User package, Design issues, Classes of RPC system , Interface definition language, exception handling, delivery guarantees, implementation , interface processing , binding, Locating the binder, RPC in Unix system, Synchronization in Distributed systems: Clock synchronization, Logical Clocks, Physical Clocks, Clock synchronization algorithms, Mutual exclusion, A centralized algorithms,

Unit III

A distributed algorithms, A token ring algorithms, comparison of the three algorithms, Election algorithms, The Bully algorithms, Ring algorithms, Dead Locks in distributed systems, Distributed deadlock detection. Process and Processors in distributed systems: Threads, Introduction, Usage, Design issues for thread packages, An example for thread packages, System models, The workstation model, The processor pool model, The hybrid model , Processor allocation, Allocation models, Design issues, Implementation issues.

Unit IV

Distributed File and Directory Services: Distributed file service requirements, File service components , Flat file service , Directory Service, Client module, Design issues, implementation techniques. Distributed shared memory Introduction: Shared memory, Consistency models, Page based Distributed shared memory, Shared – variable Distributed shared memory, Object based Distributed Shared Memory.

Text Book: Distributed Operating systems, Andrew s.Tanenbanm

Reference Books:

Advanced Concepts in Operating Systems, Singhal and Niranjan G.Shivaratna
Dietel, H.M. “An introduction to operating system” Pearson Education, 2/e.
Milenkovic. M. “An Operating System – Concepts & Design”. McGraw Hill International Education Computer science series 1992.
Peterson. J.L.Abharam Silberschatz. “Operating System Concepts”. John wiley ,1989.

Course No: MCA14208EA
Course Title: Optimization Techniques

Unit I

Linear Programming Problem (LPP): Formulating LPPs, Simplex Algorithm, Big-M Method, Two-Phase Method, Sensitivity Problems. Duality in LPP: Duality Theorems, Dual Simplex Method

Unit II

Transportation Problems: Mathematical Formulation of Transportation problem, Methods of selecting initial basic feasible solution: Matrix minima method, North-West Corner Rule, Vogel's Approximation Method; Unbalanced Transportation Problem; Degeneracy in Transportation Problem and its resolution through MODI Method(U-V Method). Assignment problems: Algorithm, Unbalanced Assignment Problem, Hungarian Method

Unit III

Inventory Models: Inventory problems and their analytical structures, deterministic economical lot size model, Stochastic and deterministic order level system. Game theory: Definition and Terminologies; Pure Strategy: saddle point, Game with two saddle points; Mixed strategies: games without saddle points, 2Xn games, Dominance Property.

Unit IV

Replacement Theory: Replacement of items that fail completely, Replacement of items that deteriorate with time. Sequencing models: Sequencing of n jobs on two machines and three machines with no passing. CPM- Determination of critical tasks. PERT- probability of completing the project on schedule.

Reference Books:

1. S.S. Raw," Optimization Methodologies".
2. H.A.TAHA," Operations Research". Pearson Education
3. S.D. Sharma," Operations Research & Optimization".
4. Kanti Swaroop, " Operations Research and Applications

Course No: MCA14209EA
Course Title : MANAGEMENT INFORMATION SYSTEM (MIS)

Unit I

Organisation and Information Systems , Changing Environment and its impact on Business - The IT/IS and its influence - The Organisation: Structure, Managers and activities - Data, information and its attributes - The level of people and their information needs - Types of Decisions and information - Information System, categorisation of information on the basis of nature and characteristics. , Transaction Processing System (TPS) - Office Automation System (OAS) - Management Information System (MIS) - Decision Support System (DSS) and Group Decision Support System (GDSS) - Expert System (ES) - Executive Support System (EIS or ESS).

Unit II

Need for System Analysis - Stages in System Analysis - Structured SAD and tools like DFD, Context Diagram Decision Table and Structured Diagram. System Development Models: Water Flow, Prototype, Spiral, RAD – Roles and responsibilities of System Analyst, Database Administrator and Database Designer. Information systems for Accounting, Finance, Production and Manufacturing, Marketing and HRM functions - IS in hospital, hotel, bank

Unit III

Enterprise Resources Planning (ERP): Features, selection criteria, merits, issues and challenges in Implementation - Supply Chain Management (SCM): Features, Modules in SCM -Customer Relationship Management (CRM): Phases. Knowledge Management and e-governance ,Nature of IT decision - Strategic decision - Configuration design and evaluation Information technology implementation plan.

Unit IV

Security and Ethical Challenges , Ethical responsibilities of Business Professionals – Business, technology, Computer crime – Hacking, cyber theft, unauthorized use at work. Piracy – software and intellectual property. Privacy – Issues and the Internet Privacy. Challenges – working condition, individuals. Health and Social Issues, Ergonomics and cyber terrorism.

RECOMMENDED BOOKS:

"Management Information Systems", Kenneth J Laudon, Jane P. Laudon, Pearson/PHI,10/e, 2007

"Management Information Systems", W. S. Jawadekar, Tata McGraw Hill Edition, 3/e, 2004

Turban, Efraim, Ephraim McLean, and James Wetherbe. 2007. Information Technology for Management: Transforming Organizations in the Digital Economy. New York, John Wiley & Sons.

Course No. MCA14210EO Open Elective (to be selected from outside department)

Course No. MCA14211EO Open Elective (to be selected from outside department)