Annexure-I to Notification No. F (Pres/Rep-PG syllabi) Acad/KU/11 dated 6-05-2011.

Post Graduate Department of Computer Sciences, The University of Kashmir, Srinagar - 190006

Main subjects of MCA ist semester – 2011

S.No	Subject code	Subject Name	Theory Max	Theory min	Internal max	Internal min	External max	External min
1	100*	Computer Fundamentals and Applications	75	30	25	10	-	-
2	101	Microprocessor , ALP and its Applications	75	30	25	10	-	-
3	102	Technical Communication	75	30	25	10	-	-
4	103	Advanced Programming Concepts in C / C++	75	30	25	10	-	-
5	104	Advanced Database Management Systems	75	30	25	10	-	-
6	105	Discrete Mathematics	75	30	25	10	-	-
7	106	Lab for 103	-	-	25	10	50	20
8	107	Lab for 101/104	-	-	25	10	50	20
TOTAL			**375**	-	**175**	-	**100**	-
Grand total			***650***					

**For non BCA students only*

Main subjects of MCA 2nd semester – 2011

S.No	Subject code	Subject Name	Theory Max	Theory min	Internal max	Internal min	External max	External min
1	201	Advance Computer Systems	75	30	25	10	-	-
2	202	Data and File Structures	75	30	25	10	-	-
3	203	Numerical and Statistical Computing	75	30	25	10	-	-
4	204	Design and Analysis of Algorithms	75	30	25	10	-	-
5	205	Advanced Data Communication	75	30	25	10	-	-
6	206	Lab for 202	-	-	25	10	50	20
7	207	Lab for 203	-	-	25	10	50	20
TOTAL			**375**	-	**175**	-	**100**	-
Grand total			***650***					

Main subjects of MCA 3rd semester – 2012

S.No	Subject code	Subject Name	Theory Max	Theory min	Internal max	Internal min	External max	External min
1	301	Advanced Operating Systems	75	30	25	10	-	-
2	302	Optimization Techniques	75	30	25	10	-	-
3	303	Computer Graphics	75	30	25	10	-	-
4	304	Computer Networks , Protocols and Programming	75	30	25	10	-	-
5	305	Software Engineering & Managemen:	75	30	25	10	-	-
6	306	Lab for 301	-	-	25	10	50	20
7	307	Lab for 304	-	-	25	10	50	20
		TOTAL	**375**	-	**175**	-	**100**	-
		Grand total					***650***	

Main subjects of MCA 4th semester – 2012

S.No	Subject code	Subject Name	Theory Max	Theory min	Internal max	Internal min	External max	External min
1	401	Organization Behavior and Personal Management	75	30	25	10	-	-
2	402	Object Oriented Modeling Analysis and Design	75	30	25	10	-	-
3	403	Data Warehousing and Data Mining	75	30	25	10	-	-
4	404	System Software Design	75	30	25	10	-	-
5	405	Elective I	75	30	25	10	-	- -
6	406	Lab for 403/Elective	-	-	25	10	50	25
7	407	Lab for 404	-	-	25	10	50	25
		TOTAL	**375**	-	**175**	-	**100**	-
		Grand total					***650***	

Elective – I (Optional paper of 4th semester)

S.No	Subject code	Subject Name	Theory Max	Theory min	Internal max	Internal min	External max	External min
1	408	Windows Programming using C#	75	30	25	10	-	-
2	409	Pervasive Computing	75	30	25	10	-	-
3	410	Programming Language Paradigm	75	30	25	10	-	-
4	411	Management Information Systems	75	30	25	10	-	-
5	412	Theory of Computation & Formal Languages	75	30	25	10	-	-
6	413	Advanced Unix/Linux Programming	75	30	25	10	-	-

Main subjects of MCA 5th semester – 2013

S.No	Subject code	Subject Name	Theory Max	Theory min	Internal max	Internal min	External max	External min
1	501	Java Programming	75	30	25	10	-	-
2	502	Modeling & Simulation	75	30	25	10	-	-
3	503	Artificial Intelligence & Neural Networks	75	30	25	10	-	-
4	504	Web Programming	75	30	25	10	-	-
5	505	Elective II	75	30	25	10	-	-
6	506	Lab for 501/502	-	-	25	10	50	20
7	507	Lab for 504	-	-	25	10	50	20
		TOTAL	**375**	-	**175**	-	**100**	-
		Grand total	*650*					

Elective II (Optional paper of 5th semester

S.No	Subject code	Subject Name	Theory Max	Theory min	Internal max	Internal min	External max	External min
1	508	Wireless and Mobile Communication	75	30	25	10	-	-
2	509	Bio-Informatics	75	30	25	10	-	-
3	510	Digital Image Processing	75	30	25	10	-	-
4	511	Quality Assurance and Testing	75	30	25	10	-	-
5	512	Design & Development of Embedded Systems	75	30	25	10	-	-
6	513	Network Security & Cryptography	75	30	25	10	-	-

Project of 6th semester – 2013

S.No	Subject code	Subject Name	Theory Max	Theory min	Internal max	Internal min	External max	External min
1	600	Project	-	-	150	75	200	100

Structure of Curriculum

1st Semester (2011)

i. 100* Computer Fundamentals and Applications
ii. 101 Microprocessor , ALP and its Applications
iii. 102 Technical Communication
iv. 103 Advanced Programming Concepts in C / C++
v. 104 Advanced Database Management Systems
vi. 105 Discrete Mathematics
vii. 106 Lab for 103
viii. 107 Lab for 101/104

* **Course No. 100 is Compulsory for those students who have not studied computer fundamentals in their Bachelor's Degree, however the marks scored will not be accounted for totaling purposes.**

2nd Semester (2011)

i. 201 Advance Computer Systems
ii. 202 Data and File Structures
iii. 203 Numerical and Statistical Computing
iv. 204 Design and Analysis of Algorithms
v. 205 Advanced Data Communication
vi. 206 Lab for 202
vii. 207 Lab for 203

3rd Semester (2012)

i. 301 Advanced Operating Systems
ii. 302 Optimization Techniques
iii. 303 Computer Graphics
iv. 304 Computer Networks , Protocols and Programming
v. 305 Software Engineering & Management
vi. 306 Lab for 303
vii. 307 Lab for 304

4th Semester (2012)

i. 401 Organization Behaviour and Personal Management
ii. 402 Object Oriented Modeling Analysis and Design
iii. 403 Data Warehousing and Data Mining
iv. 404 System Software Design
v. Elective I
vi. 406 Lab for 403/Elective I
vii. 407 Lab for 404

Elective's for 4th Semester

viii. 408 Windows Programming using C#
ix. 409 Pervasive Computing
x. 410 Programming Language Paradigm
xi. 411 Management Information Systems
xii. 412 Theory of Computation & Formal Languages
xiii. 413 Advanced Unix/Linux Programming

5th Semester (2013)

i. 501 Java Programming
ii. 502 Modeling & Simulation
viii. 503 Artificial Intelligence & Neural Networks
iii. 504 Web Programming
iv. Elective II
v. 506 Lab for 501/502
vi. 507 Lab for 504

Elective's for 5th Semester

vii. 508 Wireless and Mobile Communication
viii. 509 Bio-Informatics
ix. 510 Digital Image Processing
x. 511Quality Assurance and Testing
xi. 512 Design & Development of Embedded Systems
xii. 513 Network Security & Cryptography

6th Semester (2013)

i. Project seminar
ii. Project Work with Dissertation

Note : This revised syllabus shall be implemented from the academic session 2011 as follows :-

- **1st and 2nd Semester - Academic Session 2011**
- **3rd and 4th Semester - Academic Session 2012**
- **5th and 6th Semester – Academic Session 2013**

21/4/2011

Semester - II → 2011

Course No: 201

Course Title: Advanced Computer Systems

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.: -202
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.
String Manipulation, String Matching Techniques & Applications; Markov theorem and its applications; Sparse array and its implementation.

Unit II

Concept of Stack and Queue. Singly and Doubly-Linked Lists, Circular Linked List, their implementation and comparison. Array based and Linked List based Implementation of stack and Queues and their applications.

Unit III

Searching: Sequential and Binary Search on Array-based ordered lists and their time; complexity; Concept of Hash Functions, Hash-tables and Hashing with Chaining. Sorting Techniques: Insertion Sort, Selection Sort, Quick Sort, Heap Sort. External Sorting: k-Way Merge Strategy. File Structure: Sequential Files, Indexed Files, Direct Files.

Unit IV

Binary Trees, their implementation and traversal. 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.

Reference Books:

1. Tremblay and Sorenson: "An Introduction to Data Structures with Applications" McGraw Hill, New Delhi, 1976.
2. Horowitz and Sahni: "Fundamentals of Data Structures" Golgotia Publication, 2001.
3. Michael J.Folk et al "File Structure an Object Oriented Approach with C++", 3/e , Pearson Education
4. Tenenbaun M., "Data Structures Using C And C++", Pearson Education.
5. .Baluja G. S. , "Data Structures Through C++", Dhanpat Rai & Co.

Course No. 203
Course Title: Numerical and Statistical Computing

UNIT I
FORTRAN Programming: Introduction, Basic Elements, Input / Output. Assignment, Control Statements, Format Statements, Type Declaration Statement. Functions and Subroutine in FORTRAN, Common and Equivalent Statements, File Processing Statements.

UNIT II
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. Use of FORTRAN as a language for computer-based numerical problem-solving.
Algorithms to Compute Roots of Equation – Methods of Tabulation or Brute Force Method, Method of Bisection, The Secant Method, Newton-Raphson Method, Method for False Position. Programmatic Implementations of these methods.

UNIT III
Algorithms to Solve Linear Algebraic Equations : Gauss Elimination, Gauss Jordan, Gauss Seidel, L.U. Decomposition. Algorithms for Curve Fitting: Least Square Approximation, Lagrange Interpolated Polynomial, Newton Divided Differences Interpolating Polynomial. Programmatic Implementations.

UNIT IV
Algorithms to solve Ordinary Differential Equations – Euler Method and Modification.The trapezoidal Rule, Simpson's Rule. R-K Method. Programmatic Implementations.

REFERENCE BOOKS:

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

Course No.: – 204
Course Title: Design and Analysis of Algorithms

Unit I

Algorithms, Pseudo-code Conventions , Analysis of Algorithms, Designing Algorithms , Growth of Functions , Asymptotic notations , Some operations on O-notation. Maximum Rule , Data Analysis and Visualization , Summations , Recurrences , Substitution method , Iteration method , Recursion trees , The Master Method . Time and Space Complexity, Trade off, , Review of stack, Queues, trees , dictionaries Heap , Property and Heapsort, Hashing, graphs.

Unit II

Randomized Algorithms : Description ,Identifying the repeated element , primality testing ,Advantages and Disadvantages. Divide and Conquer, General method, Binary search, Max and Min, Merge sort, Quick sort. Greedy Method, General method, Optimal storage on tapes, Knapsack problem, Job sequencing, Optimal merge pattern, Single source shortest paths.

Unit III

Dynamic programming, General methods, Multistage graphs, All pair shortest paths, Traveling salesman problems. Backtracking, General method, 8-Queen problem, Generalized Algorithm for N-Queen Problem, Sum of subsets, Knapsack problem. Branch and Bound, General method, Basic Concepts of BFS and DFS, Least Cost Branch and Bound, 8_Queen Problem, Traveling salesperson problem.

Unit IV

Lower boundary theory , comparison trees for sorting and searching. Oracles and adversary arguments , Lower bound theory through reductions , P and NP problems. NP hard and NP complete problems _ basic concepts. Need for developing approximate algorithms. Approximate Algorithms , The vertex cover Problem , The traveling salesman problem , The set veering problem , The subset sum problem. Parallel Algorithms. Parallel Computation Model. Parallelism_ PRAM and other Models. Effect on Parallelism on Efficiency. Illustrations of problems suitable for Parallel Implementation.

Reference Books:

1. Brassard and Bratley, "Fundamentals of Algorithms", Pearson Education .
2. Sedgewick, " Algorithms in C", Pearson Education.
3. Baase "Computer Algorithms", Introduction to Design and Analysis", 3rd Ed, Pearson Horowitz, Sahni, " Fundamentals of Computer Algorithms", Galgotia Publications
4. Coremen, Leiserson, Rivest,Stein, "Introduction to Algorithms", Second Edition, PHI.
5. Aho, Hopcroft and Ullman, " The Design and Analysis of Computer Algorithms", Pearson.

Course No: 205
Course Title : Advanced 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.