SHIVAJI UNIVERSITY KOLHAPUR



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Accredited By NAAC

M.Sc Computer Science (Credit System)

M.Sc (Computer Science) Syllabus (updated) 2010

MSc-Semester-I

Sr.	Course	Credits	Letter	Marks	Grade	Credit	Grade
No.			Grade	Obtain.	Value	value	Points
1	Advanced Computer Architecture	4	B-	45	4	4*4	16
2	Theory of Computer Science	4	А	85	8	4*8	32
3	Advanced Data Structure	4	B+	70	6	4*6	24
4	Computer Network	4	В	56	5	4*5	20
5	LAB-I	4	C+	32	3	4*3	12
6	LAB-II	4	В	59	5	4*5	20
	Total	24				Total	124

MSc-Semester-II

Sr.	Course	Credits	Letter	Marks	Grade	Credit	Grade
No.			Grade	Obtain.	Value	value	Points
1	Computer Graphics	4	A-	75	7	4*7	28
2	Compiler construction	4	B-	46	4	4*4	16
3	Programming with Java	4	А	81	8	4*8	32
4	Advanced Database Theory	4	С	30	2	4*2	08
5	LAB– III	4	B+	66	6	4*6	24
6	Project & Viva	4	C-	20	1	4*1	04
	Total	24				Total	112

MSc-Semester-III

Sr.	Course	Credits	Letter	Marks	Grade	Credit	Grade
No.			Grade	Obtain.	Value	value	Points
1	Dot Net	4	A+	93	9	4*9	36
2	Parallel Computing	4	A-	77	7	4*7	28
3	Artificial Intelligence	4	С	22	2	4*2	08
4	Data Warehousing and Data Mining	4	B-	50	4	4*4	16
5	LAB– V	4	C+	31	3	4*3	12
6	Project & Viva	4	B+	64	6	4*6	24
	Total	24				Total	124

MSc-Semester-IV Total marks 200 Total credit - 8



Credit System Syllabus Master of Computer Science Semester –I Paper-I- (MSc1.1) : Advanced Computer Architecture

Unit-I

Basic computer organization and Design : Instruction codes, computer registers, computer instructions, timing and control, instruction cycle, memory-reference instructions, input-output and interrupt, complete computer description, design of basic computer, design of accumulator logic, **Microprogrammed control:** Control memory, address sequencing, microprogram example, design of control unit.

Unit-II

Central processing unit : Introduction, general register organization, stack organization, instruction format, address modes, data transfer and manipulation, program control, reduced instruction set computer(RISC), **Pipeline and vector processing:** parallel processing, pipelining, arithmetic pipeline, instruction pipeline, RISC pipeline, vector processing, array processors.

Unit-III

Input-output organization : Peripheral devices, input-output interface, asynchronous data transfer, modes of data transfer, priority interrupt, DMA, input-output processor, serial communications.

Unit-IV

Memory organization : memory hierarchy, main memory, auxiliary memory, associative memory, cache memory, virtual memory, memory management hardware. **Multiprocessors:** Characteristics of multiprocessors, interconnection structures.

References :

- 1) Computer System Architecture M Morris Mano (Pearson Education)
- 2) Computer architecture William Stalling
- 3) Computer architecture Hwang Briggs
- 4) Computer Architecture and organization -- J.P.Hayes (MGH)
- 5) Computer System Architecture -- Baer J.L. (Computer Science Press)

(15 lectures)

(15 lectures)

(15 lectures)

(15 lectures)



Credit System Syllabus Master of Computer Science Semester -I Paper-II- (M. Sc 1.2) : Theory of Computer Science

UNIT – I (15)
Preliminaries of F.A: Strings, alphabets and languages, graphs and trees, induction
proofs, set notations. Finite automata and regular expression: Finite state
machine, Basic definitions, deterministic and non- deterministic finite
automata., regular expression, Conversion of NFA to DFA.
UNIT – II (15)
Properties of regular sets: The pumping lemma for regular sets,
Closure properties of regular sets, Decision algorithm for regular
sets. Minimization of Deterministic finite automata, Automata with
output, Moore machine & Mealy machine, Ardens theorem,
application of finite automata
UNIT - III (15)
Context free grammar, derivation trees, simplification of Context
free grammar, Chomsky normal form, Greibach normal form
existence of inherently ambiguous CFL, Pumping lemma for CFL,
applications.
UNIT - IV (15)
Introduction to push down automata: Deterministic and non
Deterministic push down automata. Turing Machine: Introduction,
The Turing Machine Model, Computable functions, languages and
Techniques for Turing Machine construction, Types of Turing
machine. Unsolvable Problem: Decision problem, the halting
problem.
Books:
1. Theory of computer science by Mishra & chandrasekharan.

- Introduction to automata theory, languages and computation –John E. Hopcroft, Rajeev motwani and Jeffery D. Ullmann Pearson education
- 3. Introduction to languages and the theory of computation, John C. Martin

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) ice	Master of Computer Science
	Semester -I
THENT	Paper-III- (M. Sc 1.3) : Advanced data structure

UNIT – I Overview of Oops concepts, Stack, Applications of Stack, Queue, (15)
Priority Queue, circular queue Applications of queue, Linked lists, doubly linked list, circular list, dynamic memory allocation, implementation of linked list, further operations, implementation of sparse matrices.

Binary tree, binary search tree, representation, traversal, insertion, deletion, application Binary trees, threaded binary trees. General trees, using binary trees to represent general trees, Huffman tree, AVL tree

UNIT – III

UNIT – IV

UNIT – II

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Graphs, representation, Depth first search traversal, Breadth first search traversal, minimum spanning tree, shortest path algorithm, topological ordering. Bubble sort, insertion sort, selection sort, shell sort, Heap sort, Merge sort, Quick sort, Radix sort.

Searching, Sequential binary tree searches, ternary trees, Hashing, collision processing, B-tree indexing,Design and analysis of algorithms: Dynamic programming, Greedy algorithm, Divide and conquer, Backtracking

Books:

- 1. Classic data structures , By D. Samantha, PHI
- 2. Data structure and Program design in C By Kruse, Leung, Tondo (PHI)
- 3 Data structure algorithms and Applications in c++ Macgraw Hill, by Sartaj Sahani
- Data structure and algorithm analysis in C++ Addison weslay by Mark Allan Welss
- 5. Algorithms by Richard Johnson baugh, Marcus Schaefer, Pearson Education

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Credit System Syllabus Master of Computer Science Semester –I Paper-IV (M. Sc 1.4) : Computer Network

UNIT – I [15] Introduction to computer network Fundamentals of telecommunication theory, synchronous and asynchronous transmission, Digital and analog transmission OSI architecture, TCP/IP architecture. Local area network - Ethernet, Token Bus, Token ring, LLC and MAC Protocols, ANSI fiber distributed data interface, Multiple Access Protocols (ALOHA, CSMA/CD,CSMA/CA). UNIT – II [15] Switching and Routing - TDM, FDM, Circuit switching, Packet switching, message switching, datagram and virtual circuit, concept of routing, routing algorithm (shortest path, flooding, distance vector, link state routing, hierarchical) Congestion control algorithms (Leaking bucket, Token Bucket) Wireless LAN IEEE 802.11 - architecture, physical layer, MAC layers, Bluetootharchitecture, layers- Bluetooth, radio, Base band, other upper layers. UNIT – III [15] Network Security: Traditional Cryptography-Substitution Ciphers, Transposition Ciphers, One Time Pads, Fundamental Cryptographic Principles, Digital signature(Symmetric key, public key , message digest) X.25 Network and Supporting Protocols - Features, Layers, Channel Options, Flow Control Principle, Logical Channel Status, Packet Formats, Frame Relay Architecture TCP/IP - Internetworking, IP address structure, IP datagram, Process-to Process Delivery, UDP, TCP services and features, TCP segment. UNIT – IV [15] UNIX Networking Concepts and socket programming -Berkeley socket overview, UNIX domain protocols, socket addresses, Socket system calls, reserved ports, passing file descriptors, I/O asynchronous and multiplexing socket implementation WINSOCK programming Application - - Concept of well known ports, DNS, OSI application - VTAM, FTAM, Client server application – network file server Time and date routine, ping, FTP, remote logging, E-mail architecture etc. **Books**: Computer Networks Protocols, Standards and Interface - Black C. Computer Networks – Stalling A.S.

Computer Networks – Tannenbaum A.S.

Internetworking with TCP/IP : Principles, Protocols and Architecture – Comer

Computer Networks and Distributed Processing - Martin J.

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Windows Network Programming – Devis R. Unix Network Programming – Steven W.R. Advanced Programming in unix Environment – Steven W.R.



Credit System Syllabus Master of Computer Science Semester –II Paper-V (M. Sc 2.1) : Computer Graphics

Unit-IA) Introduction

a) Input/output devices : Keyboard, Mouse, Trackball, Joysticks, Data Glove, Digitizers, Light pen, Touch panels, Image scanners, Printers and plotters.

b) Logical Input Devices : Locator, Stroke, String, Valuator, Choice and Pick.

c) Video Display Devices : Refresh Cathode-Ray Tubes, Raster-Scan Displays, Random-Scan Displays, Color CRT Monitors, Direct-View Storage Tubes, Flat Panel Displays d) Raster-Scan Systems: Video Controller, Raster-Scan Display Processor, Random-Scan Systems.

Unit-II A) Output Primitives

a) Line, Circle, Ellipse and Curve generation algorithm, b) Polygon filling

algorithm c) Windowing and clipping : Window to Viewport transformation, line clipping and polygon clipping, **B**) **2D** and **3D** transformations : a) 2D basic transformation, other transformation, composite transformation, matrix representation and homogeneous transformation, b) 3D concepts : Display models, parallel and perspective projections c) 3D basic transformation, other transformation.

Unit-III A) Colors in computer graphics

Chromatic and achromatic light, properties of light, color lookup tables,

Color models : XYZ, RGB, CMY, HSV, HLS, **B**) **Curve generation:** a) Bezier curve, properties of Bezier curve, Cubic Bezier Curve, b) B-Spline curves : i) Uniform, Periodic B Spline, ii) Cubic, periodic B-spline, iii) Open, uniform B-Spline iv)

Non-uniform B-spline, c) Beta-Spline : Beta spline continuity conditions, cubic periodic beta spline, matrix Representation, d) Introduction to fractal (Koch and Hilberts curve) **Unit-IV A) Illumination model and shading methods** (15)

a) Basic illumination models : Ambient light, diffuse reflection, specular reflection and its Phong model, shadows and transparency, ray tracing, displaying continuous tone images, halftone pattern and Dithering techniques, aliasing and antialiasing b)Phong rendering methods: Constant intensity shading, Gouroud shading, Phong and Fast Phong shading **B)** Visible surface detection methods :Classification of visible surface detection algorithm, Back-face detection, depth-buffer method, A-buffer method and Painter's algorithm **C)** Design and implementation of Application s/w : Study of advance software platform viz. 3-D studio max, Animator Pro, Introduction to OPEN GL, comparison with the facilities provided by conventional IDEs viz. C C++, Visual computing environment,

Reference Books :

1) Computer Graphics --- Donald Heran and M Pauline Baker

2) Advanced Graphics Programming in C and C++ --- Roger Stevens

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3) Computer Graphics --- F. S. Hill J R

4) Principles of interactive Computer Graphics --- Newmann Sproul

5) Fundamentals of interactive Computer Graphics --- Foley J D & van Dam

6) Theory and problems of Computer Graphics --- Plastock & Kelly

7) Mathematical elements of Computer Graphics --- Devid rogers

8) Procedural elements of Computer Graphics --- David rogers

9) Computer Graphics : a programming approach -- Steven Harrington

10) Computer Graphics --- S P Bhandari and S A Joshi

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Code Generation: Issues in design of a code generator and target machine, Run time storage management, code generation from Dags and the dynamic code generation algorithm. Code Optimization: Sources of optimization, Data flow analysis and equations, code improving transformation and aliases, Data flow analysis and algorithms, symbolic debugging of optimized code.

Text Book:

1. Compilers - Principles, Techniques and Tools - A.V. Aho, R. Shethi and J.D. Ullman (Pearson Education.)

References: -

Compiler Construction - Dhamdere (Mc-Millan)
Compilers - Principles, Techniques and Tools - A.V. Aho, R. Shethi and J.D. Ullman (Addison Wesley publishing company.)

Credit System Syllabus Master of Computer Science Semester –II Paper-VI- (M. Sc 2..2) : Compiler Construction

UNIT 1:

UNIT 2:

UNIT 3:

Introduction to Compiling: Compilers, Phases of a compiler, Compiler construction tools, a simple one pass compiler. Lexical Analysis: Role of a Lexical analyzer, input buffering, specification and recognition of tokens, finite automata implications, designing a lexical analyzer generator.

Syntax Analysis: Role of Parser, Writing grammars for context free environments, Topdown parsing, Recursive descent and predictive parsers (LL), Bottom-Up parsing, Operator precedence parsing, LR, SLR and LALR parsers.

Syntax Directed Translation: Syntax directed definitions, construction of syntax tree, Bottom-up evaluation of S-attributed definitions, L-attributed definitions, Top-down translation and Bottom-up evaluation of inherited attributes, analysis of syntax directed definitions. Intermediate Code Generation: Intermediate languages, declarations, assignment statements and Boolean expressions, case statements, back patching, procedure calls.

UNIT 4:

3. Compiler Construction - Barret, Bates, Couch (Galgotia)

4. Unix Programming - Pepkin Pike.



Unit -I:

(15) Overview of features of java, Java virtual machine, JIT, Garbage collection, Exception handling, object serialization, Threading Swings: Introduction of JFC, swing features, model-view architecture, Heavyweight v/s lightweight components, setting pluggable look and feel for components, Swing components.

Unit-II

JDBC overview, Architecture, Drivers, database connection statements, Result sets, transaction, Java Beans: Basics of designing JavaBeans, creating and using properties, using events to communicate with other components, basics of EJB.

Unit-III

Java Networking: Remote Method --introduction , architecture, defining remote objects, creating stubs and skeleton, object serialization, dynamically loaded classes, RMI activation, registrating remote objects, marshaled objects.

CORBA-concepts, object bus, distributed objects, interoperability of distributed objects, concept of open object bus, a java interface to CORBA, creating a basic CORBA server, creating CORBA clients with JavaIDL, RMI v/s CORBA.

Unit-IV

JSP(Java Server Pages: Introduction to JSP, Use of JSP, JSP Architecture, JSP tags, Implicit and Explicit objects, Request forward, Request -time include ,use of Beans in JSP and their scopes.

Java Servlets : servlet life cycle, servlet basics, HTTP servlets, The Servlets API, request server side - Cookies, session tracking, databases ans non-HTML content, request dispatching, shared attributes, resource abstraction.

References:-

- 1. The Complete Reference : Herbert Schildt
- 2. Java Primer : Balguruswamy
- 3. Java 2.0 : Ivan Bayross
- 4. Java developer- Erik Hatcher, steve Loughran
- 5. Java server pages

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6. Java 2 Black Book –(DreamTech)



Credit System Syllabus Master of Computer Science Semester -II Paper-VIII- (M. Sc 2.4) : Advanced Database Theory

Unit –I

Introduction to DBMS : Concept and architecture of DBMS ,Schemas, instances and data independence, Introduction to conventional data models (Network, Hierarchical and Relational) (5) Relational model : Concept, Relational Algebra and Tuple and Domain Calculus SQL – basic structure of SQL Queries, set operation, aggregate function, nested subqueries, Complex queries, Views , modification of the database. Integrity constraints, Indexing RDBMS - Oracle (10)Unit –II Database Design and the E-R Model: Overview of the design process, E-R Model, constraints, E-R diagrams, E-R design Issues (7)Relational database design : Functional dependencies, Normal Forms, Loss less join and Dependencies preserving decomposition (8) Unit-III Transactions and Concurrency Control:- Transaction concept, transaction state, concurrent execution , serializability, Recoverability, Locking, Time stamp ordering, Multiple Granularity of data items. (6)Recovery System :- Failure classification, storage structure, recovery and atomicity, log-based recovery (4) Security and protection : Role of DBA, File structure, table space, segments, User database, Data dictionary management, memory structure, process structure. (5) Unit IV:-Developing application software : Using Oracle products, SQL, PL/SQL (7)Advance techniques in databases : History of ODBMS, Concept of persistence, problems posed by persistent objects, RDBMS to solve persistent objects, designing object database, concept of ODBC, Introduction to parallel, distributed databases.(8) References : 1. Korth and Silderschutz - "Database systems concepts" (TMH)

- 2. C.J.Date "Introduction to database systems" (Narosa)
- 3. Desai B. "Introduction to database concepts" (Galgotia)
- 4. Ulman J.D. "Principles of database systems" (Galgotia)

5. Oracle installation and user manual

6. Raghu Ramakrishna-"Database management system"

Credit System Syllabus Master of Computer Science Semester -III Paper-IX- (M. Sc 3.1) : Dot Net

Unit 1: (15 Hrs) Introduction to .NET, evolution of .NET platform, advantages of working .NET, .NET framework, CLR, Basic of ASP .NET, Unified programming classes, security in .NET Language and web upport {C#, VB, script .NET, web support for .NET, web services] ASP .NET Basics : ASP .NET page structure, directives, code declaration blocks, code render blocks, ASP .NET server controls, server side include directives, HTML tags, view state.

Unit 2: VB. Net and C# programming basic: Control event, Variables and variable declaration, Arrays, Functions, Operators, Conditional logic, Loops, namespace, OOP concepts, Objects, Properties, Methods, Classes, Scope, Events, Inheritance, Delegates, Interface.

Unit 3:

Validation Controls:

Client side v/s servers side validation, configuring client side validation, Required field validate, compare validater, Range Validater Range validate, Regular expression validator. Custom validater.

Unit 4:

Database Design and development :

Introduction, creating database for inheritance application, designing tables for intranet application, Relationship mgt., stored procedures, queries, introduction to data grid, data list and data sets.

Error Handling: Introduction, Types of error, viewing error information, Handling errors, .NET debugger.

Reference Books:

1. Build your own ASP .NET website using C# and VB .NET, -Zak Ruvacaba [Site Point]

(15 Hrs)

(15 Hrs)

(15 Hrs)



2. ASP .NET Bible. -Mridula Parihar



Credit System Syllabus Master of Computer Science Semester –III Paper-X- (M. Sc 3.2) : Artificial Intelligence

Objective of this course is to introduce the domain of AI problems as well as conventional and modern techniques to solve the AI problems. The background of data warehousing data structures and elementary understanding of data mining concepts is assumed. A teacher may discuss the units at length and encourage the students to take up the case studies for the implementation purpose.

Unit I: AI Problem solving: Historical development of AI, Role of heuristic in problem solving, Knowledge representation and inference, Comparison of database with knowledgebase, Expert Systems: Expert problems, Expert system case study, Predicate logic, Fact-table, Rulebase, Fuzzy logic, Case based reasoning, Design of fuzzy rulebase, Construction and implementation of knowledgebase systems. (15)Unit II: Artificial Neural Networks & Genetic Algorithms: Signal processing in biological and artificial neurons, ANN architectures, Perceptron learning, Training and implementation of a neural network (15)Unit III: Genetic Algorithms: History and evolution of G.A, Modeling a problem for the application of G.A.—Representation of data in chromosomes, Fitness function, reproduction and convergence, Comparison of ANN and GA, Applications of G.A. (15) Unit IV: AI research: Natural Language Processing-Text categorization, text summarization and Text elaboration, Vision and perception, image analysis and pattern (15)matching, Robotics

Books and references

 Neural networks, fuzzy logic and genetic algorithms, synthesis and applications by S. Rajsekaran, G.A. Vijayalaxmi Pai (EEE)

- 2. Genetic algorithms by David Goldberg (Addison and Wesley)
- 3. Principles of AI and Expert system development by David Rolston (MGH)
- 4. Artificial Intelligence by E. Ritch and K. Knight (MGH)



Unit-I

Credit System Syllabus Master of Computer Science Semester –III Paper-XI- (M. Sc 3.3) : Parallel Computing

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Parallel Computer Models – Multiprocessors and Multicomputers – Multi Vector and SIMD Computers – Conditions of Parallelism – Program flow Mechanisms – System Interconnect architecture – Parallel Processing Applications. Introduction of Parallel Computing, Implicit Parallelism, Dichotomy of Parallel Computing Platforms, Physical Organizations of Parallel Platforms, Cache Coherence in Multiprocessor System, Communication Costs in parallel machines. Routing mechanism for interconnection networks, Impact of process-processor mapping and mapping techniques. **Unit-II** (15)

Principles Of Parallel Algorithm Design: of Basics computation, Decompositiontechniques, mapping techniques for load balancing. Parallel Algorithm Models. Communication Operations: One-to-All Broadcast and All-to-one reduction, Allto-All Broadcast and Reduction, All-Reduce and prefix-Sum operations.Scatter and Gather personalized communication,Circular All to-All Shift. **Unit-III** (15)

Message Passing Computing : Principles of Message Passing Programming, send and receive operations, Message passing interface, Topologies and embedding, Overlapping Communication with computation, Collective communication and Computation Opeartions,

Groups and communicators, MPI programming.

Unit-IV

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SELECTION: Introduction, The problem and a lower bound, Sequential algorithm, Parallel algorithm. Merging, Merging network, merging on PRAM models, Sequential and ,Parallel Merging. Sorting on linear array, Sorting on PRAM models. Searching on

PRAM model ,Matrix Operations on PRAM models.

References :

- 1. Anath Grama, Anshul Gupta, George Karypis and Vipin Kumar-Introduction to
- 2. parallel Computing.
- 3. V.Rajaraman Elements of Parallel Computing (PHI)
- 4. Selim Akl The design and analysis of parallel algorithms (PHI)
- 5. Kai Hwang, Advanced Computer Architecture Parallelism Scalability Programmability, TMH (2001)
- 6. Michael J.Quinn, Parallel Computing Theory and Practice, McGrawHill
- 7. Michael J. Quinn Parallel Programming in C with MPI and OpenMP McGrawHill



Master of Computer Science Semester -III Paper-XII- (MSc. 3.4): Data Warehousing and Data Mining

Unit I

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Introduction: Data Warehouse and OLAP Technology: Data warehouse concept, A multidimensional data model, data warehouse architecture, From data warehousing to data mining. **Data Preprocessing:** Descriptive data summarization, data cleaning, data integration and transformation, data reduction

Unit II

Introduction: Data mining concepts, Data mining functionalities, classification of data mining systems, Integration of data mining system with a database or data warehouse system, major issues in data mining. Mining frequent patterns, Associations and Correlations: Basic concepts and road map, efficient and scalable frequent itemset mining methods,

Unit III

Classification and Prediction: Concept of classification and prediction, issues regarding classification and prediction, classification by decision tree induction, Bayesian classification, rule-based classification, classification by backpropagation, support vector machines, lazy learners, other classification methods.

Unit IV

Cluster analysis : Concept of cluster analysis, types of data in cluster analysis, a categories of major clustering methods, partitioning methods, hierarchical methods, data mining applications.

Reference books:

- 1) Data Mining concepts and techniques --- Jiawei Han and Micheline Kamber
- 2) Data Warehousing in real world Sam Anahory, dennis murray
- 3) Data Warehousing Amitesh sinha
- 4) Data mining Pieter adriuans, dolf zantinge.
- 5) Data Mining Methods --- Rajan Chattamvelli
- 6) Data Mining Methods --- Arun Pujari

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Master of Computer Science Semester -IV

• Industrial project/ Research project to be developed in this semester.

MSc(Computer Science)

Sr.	Paper	Revised Paper	Equivalence Paper in the old			
No.	No.		syllabus			
1	MSc1.1	Computer Architecture	Advanced Computer			
			Architecture			
2	MSc1.2	Theory of Computer Science	Theory of Computer Science			
3	MSc1.3	Advanced data structure	Advanced data structure			
4	MSc1.4	Computer Network	Computer Network			
5	MSc2.3	Programming with Java	Advanced Java Programming			
			Semester-III (MSc3.4)			
		Two chances to be given to	Object Oriented Programming			
		the old candidates	with Java			
			Semester-II (MSc2.3)			
6	MSc3.3	Parallel Computing	Parallel Computing			
7	MSc3.4	Data Warehousing and Data	New paper introduced			
		Mining				