DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY

CIRCULAR NO.ACAD/NP/Sci./B.Sc. & M.Sc./Syllabus/26/2013

It is hereby notified for information of all concerned that, on the recommendations of Ad-hoc Boards in Computer Science & Information Technology and Biochemistry, **the Hon'ble Vice-Chancellor has accepted the "*New Syllabi of [1] B.Sc. Artificial Intelligence and Mobile Computing, [2] M.Sc. Artificial Intelligence and Embedded Technology, [3] M.Sc. Computer Science and Networking and [4] M.Sc. Plant Breeding and Molecular Genetics First Year, Semester-I & II*" under the Faculty of Science"** on behalf of the **Academic Council Under Section-14(7) of the Maharashtra Universities Act, 1994 as appended herewith.**

This is effective from the **Academic Year 2013-2014** and onwards.

All concerned are requested to note the contents of this circular and bring the notice to the students, teachers and staff for their information and necessary action.

University Campus,
Aurangabad-431 004.
REF.NO.ACAD/NP/ B.Sc. & M.Sc. /
SYLLABUS/2013/29551-60

Date:- 13-08-2013.

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Director,
Board of College and
University Development.

Copy forwarded with compliments to :-

1] The Principals, affiliated concerned Colleges,
Dr. Babasaheb Ambedkar Marathwada University.

2] The Director, University Network & Information Centre, UNIC, with **a request to upload the above Syllabus on University Website [www.bamu.ac.in].**

Copy to :-

1] The Controller of Examinations,
2] The Superintendent, [B.Sc. Unit],
3] The Superintendent, [Co-Ordination],
4] The Programmer [Computer Unit-1] Examinations,
5] The Programmer [Computer Unit-2] Examinations,
6] The Director, [E-Suvidha Kendra], in-front of Registrar's Quarter, Dr. Babasaheb Ambedkar Marathwada University,
7] The Record Keeper,
Dr. Babasaheb Ambedkar Marathwada University.

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S/-130813/-*

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad

Syllabus of

M.Sc. (Computer Science and Networking)

With Effective from June 2013
(Academic Year 2013-2014 Onwards)

DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY, AURANGABAD.

ORDINANCE-1

Statement showing the details of Tuition Fees and Other Fees for **M.Sc. (Computer Science and Networking) Course per Semester** on **"Non-Grant Basis"** under the Faculty of Science.

Sr. No.	Description	Fees
1	**Course**	M.Sc. Computer Science & Networking
2	**Admission Fees**	Rs. 100/-
3	**Tuition Fees**	Rs. 11,650/-
4	**Library Fees**	Rs. 100/-
5	**Laboratory Fees**	Rs. 4,000/-
6	**Medical Exam Fees**	Rs. 30/-
7	**Gymkhana Fees**	Rs. 50/-
8	**Sports Fees**	Rs. 50/-
9	**Student Welfare Fees**	Rs. 20/-
10	**Total**	**Rs. 16,000/-**

Admission/ Promotion:

Duration: (Four Semesters means Two Academic Years)
Intake: 20
Eligibility:

i) B.Sc. Computer Science / Information Technology / Computer Application / Bioinformatics / Informatics **OR** B.E/B. Tech. in Computer Science and Engineering/IT.**OR ii).** Any Science Graduate with at least one Optional Subject as Computer Science / Information Technology / ~~Electronics~~ / Computer Application, studied for at least three years, with a minimum of 50% marks (45% marks for SC/ST) in aggregate.

Scheme of Paper Setting:

1) Each theory paper is of 50 marks and is divided in 2 sections. Duration of the theory examination will be of two hours. The entire syllabus of theory paper is divided in 5 units. There will be one question on each unit with internal. The question paper should be set as follows:

i. There should be two sections, Section-A (10 marks) and Section-B (40 marks).

ii. Section A should have 10 objective type questions/one line answer question/true-false/ fill in the blank type question with one mark each.

iii. Section B should have seven questions of which five questions need to attempt by the students and should be ɔm each unit of the syllabus. Each question of this part will have 8 marks and divided into two bits (a and b). Each bit carry 4 marks each. The objective of **Bit a** will be to test students regarding theoretical concepts. The questions should not be of general type, like discuss, and explain as far as possible. **Bit b** questions should be problem oriented. The questions should be designed to test students on applied nature of theoretical concepts.

iv. Question paper format will be as follows:

Q. No.	Format	Marks
	Section-A	
1.	Multiple choice / Fill in the blanks / Match the pairs / Answer in one line / Define the terms 1) 2) . . 10)	1 X 10 = 10
	Section-B	
2.	a) b)	2 X 4 = 8
3.	a) b)	2 X 4 = 8
4.	a) b)	2 X 4 = 8
5.	a) b)	2 X 4 = 8
6.	a) b)	2 X 4 = 8
7.	a) b)	2 X 4 = 8
8.	a) b)	2 X 4 = 8
	Total	**50**

2. The duration of the practical examination will be of two hours. There should be at least one external examiner for each practical examination.
3. Students are required to maintain a well documented signed with date journals for each practical. In journals, students must write the dates on which the practical has been performed.
4. The students must keep a diary for projects and seminar. In diary they must record the progress of the project and seminar and be signed by the concerned teacher/guide time to time.
5. Project Report: Two typed and duly bound copies of project report shall be submitted at least 3 weeks before commencement of the Theory/Practical examination which ever commences earlier.
6. The following shall be the Scheme of instruction and examinations of theory papers.

M.Sc. Computer Science and Networking

Semester I

Paper No.	Title of Paper	No. of hrs. / week	Maximum Marks	Examination hours
I	Object Oriented Programming using C++	04	50	02
II	Operating System	04	50	02
III	Database Management System	04	50	02
IV	Networking fundamentals	04	50	02
V	Practical-1 based on theory paper-I and II	08	50	02
VI	Practical-2 based on theory paper-III and IV	08	50	02
	Total Marks →		**300**	

Semester II

Paper No.	Title of Paper	No. of hrs. / week	Maximum Marks	Examination hours
VII	Design and analysis of computer algorithm	04	50	02
VIII	Computer and Network Security	04	50	02
IX	Discrete Mathematics	04	50	02
X	Programming in JAVA	04	50	02
XI	Practical-3 based on theory paper-VII and VIII	08	50	02
XII	Practical-4 based on theory paper-IX and X	08	50	02
	Total Marks →		**300**	

Semester-I

Paper Code:-I Subject Name: Object oriented Programming using C++ Total Lectures:40

Unit -1 **(8 Th.Hrs)**

Introduction to C++ - Procedural Vs Object oriented programming, Features of object oriented programming. Classes and Objects – Class, Object, Class members, Access specifiers, Scope resolution operator, Static class members, Nested classes, Local Classes, passing an object to function , Returning an object to function, Dynamic memory allocation.

Unit -2 **(8 Th.Hrs)**

Constructors, Destructors, Function overloading, Types of constructors, Default function arguments, Function overloading and ambiguity.

Unit -3 **(8 Th.Hrs)**

Operator Overloading – Unary operators, Binary operators, Data conversion, Operator overloading using friend function, Special operators like [ ], [ ], ->, Pitfalls of operator overloading and conversion.

Unit -4 **(8 Th.Hrs)**

Inheritance – Derived class and base class, Constructor, Destructor, Overriding member function, Scope resolution, Access specifiers, Public & private inheritance, Levels of inheritance, multiple inheritance, Virtual base class, Containership.

Unit -5 **(8 Th.Hrs)**

Polymorphism – Virtual functions, pure virtual functions, Abstract class, Virtual destructors, Early Vs late binding. File I/O – Stream class hierarchy, Formatted file I/O, Character I/O, Binary I/O, File pointers. Exception Handling – Simple exceptions, multiple exceptions, throw.

Reference Books:

Herbert Schildt: The Complete Reference C++, 4 th Edition, Tata McGraw Hill, 2003.

Semester-I

Paper Code:-II **Subject Name: Operating Systems** **Total Lectures:40**

Unit-1 **(8 Th.Hrs)**

Introduction

Introduction to OS, OS as extended machine, OS as resource manager, History of OS:-first to fourth generation (simple batch system , time - sharing systems, Real-time systems, parallel systems, distributed system), OS concepts (Process , Files, Shell), System calls

Process Management:

The process model, process states, PCB (process control block), Threads

Process Synchronization:

Interprocess communication (IPC), race condition, critical sections, mutual exclusion with busy waiting, sleep & wake-up, semaphores, event counters, monitors, message passing, classical IPC problems: Dining philosophers problem, Readers & Writers problems.

Unit-2 **(8 Th.Hrs)**

Process scheduling:

Round Robin scheduling, priority scheduling, multiple queues, shortest job first, policy driven scheduling, two level scheduling

Memory management:

Memory management without swapping or paging, use of multiprogramming.
Swapping: Multiprogramming with fixed and variable partitions, memory management with bitmaps, linked lists and buddy system. Allocation of swap space, Virtual Memory: Paging, segmentation.
Page Replacement Algorithms:
Optimal page replacement, Not-Recently used page replacement, Firstin-first -out, least recently used random page replacement.

Unit -3 **(8 Th.Hrs)**

Principles of I/O Hardware:

I/O devices, Device controlling.
Principle of I/O software: Goals of I/O software, Interrupt handlers, Device drivers, device - independent I/O software, user space I/O software.

Deadlocks: Resources, deadlock modeling, the Ostrich algorithm, detection & recovery, deadlock prevention, deadlock avoidance (Banker's Algorithm)

Unit-4 **(8 Th.Hrs)**

Overview:
Fundamentals, Types, Standards, Foundations of Cryptography and Security,Approaches and techniques used, Encryption schemes, Mathematical tools for Cryptography.

Unit-5 **(8 Th.Hrs)**

Digital signatures, Certificates and standards, setting and definitional issues, Length-restricted signature scheme, Constructions of signature schemes,planning techniques.

Maintenance:
Configuring secure access, Management, ongoing maintenance, standards development, ensuring site security.

Text/Reference Books:

- Andrew S. Tanenbaum, "Modern Operating Systems", Prentice Hall
- Andrew S. Tanenbaum, "Operating System Design & Implementation", Second edition, Pearson Education .
- Abraham Silberschatz, Peter Galvin, "Operating System Concepts", Fifth edition, Addison Wesley.
- Stallings, William, " Cryptography and Network Security : Principles and Practice"
- Vacca, " Guide to Wireless Network Security"

Semester-I

Paper Code:III **Subject Name: Database Management Systems** **Total Lectures:40**

Unit-1 **(8 Th.Hrs)**

Introduction

Introduction to Database Management System, Examples, Characteristics of the Database Approach, Advantage of using a Database Approach, Database System concepts and Architecture, Data Models, Schemes and Instances, DBMS architecture and Data Independence, Database Languages and Interfaces, Database System Environment, Classification of Database Management Systems.

Unit-2 **(8 Th.Hrs)**

ER Models, Relational Models

Database Modeling using the ER Model, Using High-Level conceptual Data Models for Database design, An example Database Application, Entity types, Entity Sets, Attributes and keys,Relationships, Relationship types, roles and Structural Constraints, Week Entity types, Refining the ER Design for the Company Database, ER Diagrams, naming conventions and design Issues, the Relational Data Model, Relational constraints, the Relational Algebra: Relational Model Concepts,Relational concepts and Relational Database Schemes, Update Operation and Dealing with
Constraints Violations, Relational Database Design, Using ER-to-Relational Mapping.

Unit-3 **(8 Th.Hrs)**

Database Designing

Functional Dependencies and Normalization for Relational Database, Informal Design Guidelines for Schemes, Functional Dependencies, Normal Forms based on Primary keys, General Definitions of Second and Third Normal forms, Boyce- Codd Normal form, Relational Database Design Algorithms and Further Dependencies, Algorithms for Relational Database Schema Design,Multivalued Dependencies and Fourth Normal Form, Join Dependencies and Fifth Normal Form,Inclusion Dependencies, Other Dependencies and Normal Forms.

Unit -4 **(8 Th.Hrs)**

SQL-The Relational Database Standard

Data definition, Constraints and Schema changes in SQL 2, Basic Quires in SQL, More Complex SQL Quires, Insert, Delete and Update Statements in SQL, views(Virtual Tables) in SQL,Specifying general constraints as Assertion features of SQL. Integrity constrains, Triggers,Functional dependencies.

Unit-5 **(8 Th.Hrs)**

Transaction Processing

Transaction Processing Concepts, Introduction to Transaction Processing, Transaction and System ,Concept, Desirable properties of Transactions, Scheduling and Recoverability, Serializability of Scheduling, Transaction Support in SQL, Concurrency control techniques, Concurrency techniques for concurrency control, concurrency control based on timestamp based protocol, validation based
protocol, deadlock handling, Database Recovery Techniques based on Immediate Update, Failure classification, Shadow Paging, Log based recovery, failure with loss of Nonvolatile Storage.

Text Books:

- Abraham Silberschatz and Henry Korth, Sudarshan : *Database System Concepts*, 4th Edition,
- ISBN : 0-07-120413-X, Tata McGraw-Hill.
- Elmasri and Navathe : *Fundamentals of Data base Systems* (3rd Ed.), Addison-Wesley, 1999.

Semester-I

Paper Code:-IV **Subject Name: Networking Fundamentals** **Total Lectures:40**

Unit-1 **(8 Th.Hrs)**

Introduction to Computer Networks

Objective components of Communication Networks, topologies, centralized and distributed networks, LAN, MAN, WAN, Broadcast vs Point to Point networks,Overview of network model: ISO - OSI and TCP/IP. Network design issues,layered architecture, interfaces and services, service primitives and relationships of services to protocols.

Unit-2 **(8 Th.Hrs)**

Physical Layer & Data Link Layer

Communication Media: Twisted pair, coaxial cables, fiber optic cables,Wireless Communication. Design issues, framing, error detection and correction, CRC, Elementary protocols – stop and wait, Sliding window, Slip,bridges, circuit switching, message switching, packet switching network.

Unit-3 **(8 Th.Hrs)**

Networks and Transport Layer

Virtual circuits, and datagram networks, circuit switching, and packet switching. Routing algorithms, routers and routing protocols. Congestion control. Transport layer services and principles. Connectionless v/s connectionoriented services like UDP and TCP, QOS (Quality of Services).

Unit-4 **(8 Th.Hrs)**

Application Layer

Introduction to Cryptography, Secret key and public key algorithm, Security issues for Intranet and Internet, DNS (Domain name System), Electronic mail,World wide Web, Writing a web page in HTML.

Unit-5 **(8 Th.Hrs)**

TCP/IP Protocol Suite

Layered Architecture, Protocol Stack., IP Addressing: Classes, static, dynamic (DHCP). Ipv4 v/s Ipv6, Sub-netting: masking and subnet masking. Protocols:Ping, FTP, telnet, http(www), SMTP, SNMP, Trace route, TFTP, BOOTP,DNS, NFS, RPC, ICMP, IGMP, ARP, RARP, etc.

Digital Networks

Advantages, Signal conversion, digital carrier systems, ISDN, SIDN Channels, ISDN Layers, SBS, Integrated Networks, IEEE LAN Standards, IEEE 802 standards, IEEE 802.11 standards for wireless networks.

Text Books:

- Behrouz A. Forouzan: Data Communication and Networking, 4th Edition Tata McGraw-Hill, 2006.
- Alberto Leon-Garcia and Indra Widjaja: Communication Networks -Fundamental Concepts and Key architectures, 2 nd Edition Tata McGraw-Hill, 2004.
- William Stallings: Data and Computer Communication, 8th Edition, Pearson Education, 2007.
- Larry L. Peterson and Bruce S. Davie: Computer Networks – A Systems Approach, 4th Edition, Elsevier, 2007.
- Nader F. Mir: Computer and Communication Networks, Pearson Education, 2007.

Semester-I

Paper Code:- V Subject Name: Practical-1 based on paper no. I & II Total Practicals:20

It will contain list of practical 10 assignments based on each paper no.I and paper no.II

Semester-I

Paper Code:- VI Subject Name: Practical-2 based on paper no. III & IV Total Practicals: 20

It will contain list of practical 10 assignments based on each paper no.III and paper no.IV

Semester-II

Paper Code:-VII Subject Name: Design and analysis of computer algorithm Total Lectures:40

Unit 1 **(8 Hrs)**

Introduction and a brief review of Elementary Data Structures

Definition of an Algorithm, Algorithm specification, Performance analysis: -Space and time complexity, Asymptotic Notation, Practical Complexities,Performance Measurement, heap and heap sort, sets and disjoint set, Union, graphs, hashing.

Unit 2 **(8 Hrs)**

Divide and Conquer

General method of Divide and Conquer, Binary search, finding the maximum and minimum, merge sort, quick sort, Selection, Strassen's Matrix Multipli cation.

Unit 3 **(8 Hrs)**

The Greedy Method

General method, Knapsack Problem, Tree vertex splitting, Job sequencing with deadlines, Minimum cost spanning trees, optimal storage on tape, optimal merge Patterns, Single source shortest paths.

Unit 4 **(8 Hrs)**

Basic Search and Traversal Techniques

The techniques for binary trees, Techniques for graphs, connected components and spanning trees, Biconnected Components and DFS

Unit 5: **(8 Hrs)**

Backtracking and Branch and Bound Technique

The general method of backtracking, The 8- queens problem, sum of subsets, Graph coloring, Hamiltonian cycles, Knapsack problem using backtracking. The method of branch and bound, 0/1 knapsack problem, Traveling sales person problem using branch and bound.

Key Distribution and Key Agreement

Introduction, Key Predistribution , Blom's Scheme, Diffie-Hellman Key Predistribution, Kerberos, Diffie-Hellman Key Exchange, The Station-to-station Protocol, MTI Key Agreement Protocols, Key Agreement Using Self-certifying

Unit-3 **(8 Th.Hrs)**

Security Trends, The OSI Security Architecture, Security Attacks, Security Services, Security Mechanisms, A Model for Network Security

Unit-4 **(8 Th.Hrs)**

Authentication Applications: Kerberos , X.509 Authentication Service, Public-Key Infrastructure, Recommended Reading an d Web Sites, Key Terms, Review Questions, and Problems, A Kerberos Encryption Techniques, Electronic Mail Security, Pretty Good Privacy, S/MIME, Key Terms, Review Questions, and Problems, A Data Compression Using Zip, Radix-64 Conversion, PGP Random Number Generation

Unit-5 **(8 Th.Hrs)**

Intruders:
Intrusion Detection, Password Management, Recommended Reading and Web Sites.

Malicious Software:

Viruses and Related Threats, Virus Countermeasures, Distributed Denial of Service Attacks.

Firewalls:

Firewall Design Principles, Trusted Systems, Common Criteria for Information Technology Security valuation

Books:

- Cryptography: Theory and Practice, Douglas Stinson, CRC Press, CRC Press LLC (Unit I and II)
- Cryptography and Network Security Principles and Practices, Fourth Edition, William Stallings, PHI(Pearson), (Unit: III-VI)

References

Information Security and cyber laws, Saurabh Sharma, student series, Vikas publication. Encryption, Ankit Fadia and J. Bhattacharjee, Vikas publication

Semester-II

Paper Code: IX **Subject Name: Discrete Mathematics** **Total Lectures:40**

Unit-1 **(8 Th.Hrs)**

Sets and Probabilities

Contribution of sets, finite and infinite sets, unaccountably infinite sets. The rules of sum and product, discrete probability, conditional probability.

Unit-2 **(8 Th.Hrs)**

Relations and Functions

Properties of Binary Relations, Equivalence relation and partitions, Partial ordering Relations and Lattices. Chain and Anti-chains, A Job-Scheduling problem, Functions and Pigeonhole principles.

Unit- 3 **(8 Th.Hrs)**

Graphs & Trees

Basic terminology, Multigraphs and Weighted graphs, Paths and Circuits, Shortest paths in weighted graphs, Eulerian paths and circuits, The traveling salesman problem, factors of a graph, Planner graphs, Trees, Rooted Trees, Path lengths in rooted trees, Prefix codes, Binary search trees, spanning trees and cutsets, Minimum spanning trees. Transport networks.

Unit-4 **(8 Th.Hrs)**

Discrete Numerical Functions and Recurrence Relations

Manipulation and Numerical Functions, Asymptotic behavior, Generating functions and Combinatorial Problems, Recurrence relations, linear recurrence relations with constant coefficients, omogeneous solutions, Particular Solutions, Total Solutions, Solutions by the method of generating functions.

Unit-5 **(8 Th.Hrs)**

Boolean Algebra

Principal of duality, Basic properties of Algebraic systems defined by lattices, Boolean lattices and Boolean algebras, Boolean functions and Boolean expressions, Propositional Calculus, Design and implementation of digital networks, switching circuits.

Text/Reference Books:

- C.L.Liu , "Elements of Discrete Mathematics", Tata McGraw-Hill Publication
- Kollman, Busby and Ross, "Discrete Mathematical Structures", PHI

Semester-II

Paper Code:-X **Subject Name: Programming in JAVA** **Total Lectures:40**

Unit-1 **(8 Th. Hrs)**

Basics of Java:

Java's importance to the internet, Java's Magic: The Byte Code, Java Buzzwords, Data types, basic syntax of Java Classes in Java: Introduction to Methods, Constructors, This Keyword, Overloading Methods, Overloading Constructors, Using objects as Parameters, A closer look at argument passing, Returning objects, Understanding Static, Command Line Arguments.

Inheritance:

Basics, Using Super, Method Overriding, Abstract methods and Class, Using Final with Inheritance, Packages, Importing Packages and Interfaces.

Unit -2 **(8 Th.Hrs)**

Exception handling:

Fundamentals, Exception Types, Uncaught Exceptions, Using Try and Catch,Multiple Catch Clauses, Throw, throws, finally, Built-in Exceptions and creating your own Exception Sub Classes.

Multithreading:

Java Thread Model, The Main thread, Creating a Thread, Creating Multiple Threads, Using Alive ( ) and Join ( ),Thread Priorities, Synchronization, Interthread Communication, Suspending, Resuming and Stopping Threads.

Unit- 3 **(8 Th.Hrs)**

Applets:

An Overview of Applets, the Life Cycle of an Applet, creating applets, the Graphics Class, Using Colors, Displaying Text, Using Applets in a Web Page .

Unit-4 **(8 Th.Hrs)**

Frames and JDBC:

Introduction to concept of Frames JDBC: DBMS, RDBMS Concepts, Introduction to SQL, Basics of Database Connectivity, Introduction to JDBC, JDBC Architecture, Steps to create JDBC Application, JDBC Interfaces, classes and Exceptions

Unit -5 **(8 Th.Hrs)**

I/O Package:

Files and Directories, Overview of Codes and Streams, Buffered Character Streams, the Print Writer Class, Byte Streams

Text Books:

- Herbert Schildt: "The Complete Reference Java2", 5th Edition TMH Publications. 10
- Deitel & Deitel: "How To Program JAVA", Pearson Education
- E Balguruswamy: "Programming with Java- A Primer", TMH
- Core Java Vol I and Vol II : Sun Microsystems Press

Semester-II

Paper Code:- XI Subject Name: Practical-3 based on paper no. VII & VIII Total Practicals:20

It will contain list of 10 practical assignments based on each paper no.VII and paper no. VIII

Semester-II

Paper Code:- XII Subject Name: Practical-4 based on paper no. IX & X Total Practicals:20

It will contain list of 10 practical assignments based on each paper no. IX and paper no. X.