DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY

CIRCULAR NO.SU/Engg./B.E.IIIrd Yr./64/2018

It is hereby informed to all concerned that, the syllabi prepared by the Board of Studies & recommended by the Dean, Faulty of Science & Technology the **Academic Council at its meeting held on 30 June & 02 July 2018 has accepted the following syllabi in accordance with Choice Based Credits & Grading System for all Branches Third Year Engineering & Second Year of Bachelor of Architecture** under the Faulty of Science & Technology as enclosed herewith:-

Sr.No.	Syllabi as per CBC & GS
[1]	Third Year B.E.[Civil Engineering],
[2]	Third Year B.E [Mechanical Engineering],
[3]	Third Year B.E [EE/EEE/Electrical, Electronics & Power,],
[4]	Third Year B.E [Chemical Engineering],
[5]	Third Year B.E [Instrumentation Engineering],
[6]	Third Year B.E [E&TC/E&C/IE/ECT],
[7]	Third Year B.E [CSE/IT].
[8]	Second Year of Bachelor of Architecture.

This is effective from the Academic Year 2018-2019 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.SU/2018/10497-03
Date:- 03-07-2018.

6/7/18

Deputy Registrar,
Syllabus Section

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 this Circular on University Website.**

Copy to :-

1] The Director, Board of Examinations & Evaluation,
2] The Section Officer, [Engineering Unit] Examination Branch,
3] The Section officer, [Eligibility Unit],
4] The Programmer [Computer Unit-1] Examinations,
5] The Programmer [Computer Unit-2] Examinations,
6] The In-charge, [E-Suvidha Kendra],
7] The Public Relation Officer,
8] The Record Keeper,

DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY, AURANGABAD.

Curriculum under Choice Based Credit & Grading System

Revised Syllabus of

Bachelor of Engineering

Third Year

Computer Science & Engineering/IT

Under the Faculty of Science & Technology

[Effective from the Academic Year 2018-19 & onwards/-

Dr. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY, AURANGABAD

FACULTY OF SCIENCE AND TECHNOLOGY

Board of Studies in Computer Science and Engineering

Curriculum structure of TE CSE/IT

PART-I

Sub Code	Semester-I	Contact Hrs/Week				Examination Scheme						Duration of The Theory Examination
	Subject	L	T	P	Total	CT	TH	TW	PR	Total	credits	
CSE301	Operating Systems	4	--	--	4	20	80	--	--	100	**4**	**3 Hrs**
CSE302	Theory of Computation	4	--	--	4	20	80	--	--	100	**4**	**3 Hrs**
CSE303	Database Management Systems	4	--	--	4	20	80	--	--	100	**4**	**3 Hrs**
CSE304	Programming in JAVA	4	--	--	4	20	80	--	--	100	**4**	**3 Hrs**
CSE341 CSE342 CSE343	Elective –I	4	--	--	4	20	80	--	--	100	**4**	**3 Hrs**
CSE321	Lab 1: Database Management Systems	--	--	2	2	--	--	--	50	50	**1**	
CSE322	Lab 2: Programming in JAVA	--	--	2	2	--	--	--	50	50	**1**	
CSE323 CSE324 CSE325	Lab 3: Elective –I	--	--	2	2	--	--	50	--	50	**1**	
CSE326	Lab 4: Software Development Lab-I (ASP.NET using C#)		--	2	2	--	--	--	50	50	**1**	
BSH305	Communication Skills-II	2	--	--	2	--	--	50	--	50	**2**	
	Total	**22**	**--**	**8**	**30**	**100**	**400**	**100**	**150**	**750**	**26**	

PART - II

Sub Code	Semester-II	Contact Hrs/Week				Examination Scheme						
	Subject	**L**	**T**	**P**	**Total**	**CT**	**TH**	**TW**	**PR**	**Total**	**Credits**	**Duration of The Theory Examination**
CSE351	Advanced JAVA	4	--	--	4	20	80	--	--	100	**4**	**3 Hrs**
CSE352	Software Engineering	4	--	--	4	20	80	--	--	100	**4**	**3 Hrs**
CSE353	Design and Analysis of Algorithms	4	--	--	4	20	80	--	--	100	**4**	**3 Hrs**
ITD354	Ebusiness Systems (For IT)	4	--	--	4	20	80	--	--	100	**4**	**3 Hrs**
CSE354	Systems Programming (For CSE)											
CSE391 CSE392 CSE393	Elective-II	4	--	--	4	20	80	--	--	100	**4**	**3 Hrs**
CSE371	Lab 5: Advanced JAVA	--	--	2	2	--	--	--	50	50	**1**	
CSE372	Lab 6: Software Testing & Quality Analysis	--	--	2	2	--	--	50	--	50	**1**	
CSE373	Lab 7: Design and Analysis of Algorithms	--	--	2	2	--	--	--	50	50	**1**	
CSE374 CSE375 CSE376	Lab 8 Elective-II	--	--	2	2	--	--	50	--	50	**1**	
CSE377	Lab 9 SDL-II (Android)	--	--	4	4	--	--	--	50	50	**2**	
	Total of Semester II	**20**	**--**	**12**	**32**	**100**	**400**	**100**	**150**	**750**	**26**	
	Total of Semester I & II	**42**		**20**	**62**	**200**	**800**	**200**	**300**	**1500**	**52**	

Elective I & II:

Code	Elective -I	Code	Elective - II
CSE341	Computer Network Architecture and Protocols	CSE391	Distributed Operating System
CSE342	Digital Image Processing	CSE392	Artificial Intelligence
CSE343	Embedded Systems	CSE393	Network Security

L: Lecture hours per week, **T**: Tutorial hours per week, **P**: Practical hours per week, **CT**: Class Test, **TH**: University Theory Examination, **TW**: Term Work, **PR**: Practical/Oral Examination

Dr. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY, AURANGABAD
FACULTY OF SCIENCE AND TECHNOLOGY
Third Year Engineering (CSE/IT)
Semester – I

Course Code: CSE301 **Title: Operating systems**

Teaching Scheme
Theory: 04 Hours/Week

Examination Scheme
Class Test: 20 Marks
Theory Examination (Marks): 80 Marks
Theory Examination (Duration): 03 Hours

Prerequisite:
1: Understanding of data structures and digital electronics,
2: Knowledge of basic computer, hardware components, microprocessor and peripheral components.
3: Programming skills in C, C++.

Objectives:
1. Students should learn fundamentals which will help them to understand design of modern operating system.
2. To study different components of OS.
3. Students should have overview of different types and structures of OS.
4. Should learn important system resources and their management policies.

CONTENTS

SECTION A

Unit 1: Introduction (6 hrs)

- Operating System as an extended machine , OS as a resource manager.
- History of operating system: Generations- batch system, multiprogramming, time sharing, multitasking, distributed, handheld computer system, embedded OS, real time OS and smart OS. Computer hardware review. OS concepts.
- Operating system structure: monolithic, layered systems, microkernel, client server models, virtual machines, exokernels, mainframe OS. System calls.
- Comparison of Linux, Windows, DOS

Unit 2: Process management (8 hrs)

- Processes: Process Model, Process creation/termination, Hierarchies, process states (two state, five state), Implementation of process.
- THREAD: process and thread, thread functionality,user level and kernel level threads.
- Interprocess Communication: race condition, critical regions, mutual exclusion with busy waiting, sleep and wakeup, Producer consumer problem, semaphore, message passing,Monitors
- Classical IPC Problem: Dining philosopher problems, Readers and writers problems.

- Process Scheduling, scheduling criteria, scheduling algorithms**.**

Unit 3: File systems (6 hrs)

- Files: File Naming, File Types, Access, File operations,
- Directories: Types, Operations.
- File System Implementation: Layout, Implementation Files and directories.
- File system management: Disk space management, File system consistency.
- Comparison of Linux and windows file systems

SECTION B

Unit 4: Memory management (8 hrs)

- Memory management strategies: Basic Hardware, Address binding, Logical vs Physical Address space, Swapping, contiguous memory allocation.
- Memory partitioning: fixed, dynamic partitioning, buddy system reallocation, fragmentation.
- Managing free memory: memory management with bitmap, linked list.
- Virtual memory: demand paging, page replacement algorithms- options, FIFO, LRU, allocations of frames, thrashing and working set models.
- Paging: Basic method, hardware support, structure of page table.
- Segmentation: Basic method, hardware

Unit 5: Device management (6 hrs)

- Principles of I/O hardware: I/O device controllers
- Principles of I/O software.
- I/O software layers
- Disk: disk hardware-magnetic disk, RAID, CDs, DVDs, Disk formatting, disk scheduling algorithms, clocks

Unit 6: Deadlock Management (6 hrs)

Deadlock:

- Introduction to deadlocks: Resources- Types and resource acquisition. Conditions for resource deadlock, Deadlock Modelling.
- Deadlock detection and recovery with one resource and multiple resources.
- Deadlock avoidance:- Resource trajectories, safe & unsafe states, bankers algorithm for single and multiple resources
- Deadlock Prevention.

Text Books:

1. Andrew S. Tanenbaum, “Modern Operating Systems”, Third Edition, Prentice Hall Publication.
2. Peter Galvin, Greg Gagne, Abraham Silberschatz, “Operating Systems Concepts”, 8th Edition,

Reference Book:

1. William Stallings, "Operating Systems: Internal and design Principles", 7th Edition, Pearson Education.

Links :

1. http://stst.elia.pub.ro/news/SO/Modern%20Operating%20System%20-%20Tanenbaum.pdf
2. Comparison of LINUX and Windows file systems:- https://www.guru99.com/linux-differences.html
3. Memory management requirements & Memory partitioning: http://dinus.ac.id/repository/docs/ajar/Operating_System.pdf
4. Case study:- Windows 7:- http://codex.cs.yale.edu/avi/os-book/OSE1/slide-dir/PDF-dir/ch16.pdf

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For 80 marks Paper:

1. Minimum ten questions.
2. Five questions in each section.
3. Question no. 1 from section A and Question no. 6 from section B, 10 marks each, will be compulsory.
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Third Year Engineering (CSE/IT)
Semester – I

Course Code: CSE302 **Title: Theory of Computation**

Teaching Scheme
Theory: 04 Hours/Week

Examination Scheme
Class Test: 20 Marks
Theory Examination (Marks): 80 Marks
Theory Examination (Duration): 03 Hours

Prerequisite:

1. Discrete mathematics

Objectives:

1. To introduce the fundamental concepts of formal languages, grammars and automata theory.
2. To study and develop fundamentals for computational theory.
3. To apply abstract models for solving problems in computing.
4. To understand the differences between decidability and undecidability.

CONTENTS

SECTION A

Unit 1: Finite Automata (8 hrs)

Introduction to Finite Automata, Structural representation, Automata and complexity. Chomsky Classification of languages, Central Concepts of Automata Theory, Deterministic Finite Automata, Nondeterministic Finite automata, FA with epsilon transitions, Applications of FA, FA with output : Moore and Mealy machine

Unit 2: Regular Expressions and Languages (8 hrs)

Regular Expressions, Finite automata and Regular Expression, Algebraic laws for RE, Ardens theorem, Pumping lemma for Regular languages, Applications of pumping lemma, Closure and Design properties of regular languages, Equivalence and minimization of Automata, Applications of Regular Expressions.

Unit 3: Context Free Grammars and Languages (4 hrs)

Context Free Grammars, Parse trees, Applications of CFG, Ambiguity in grammars and languages, Normal Forms for CFG: Chomsky Normal Form

SECTION B

Unit 4: Pushdown Automata and LBA (8 hrs)

Pushdown Automata – Definition, Languages of PDA, Acceptance by Empty Stack and Final State, Equivalence of PDA and CFG , Deterministic Pushdown Automata, Pumping lemma for CFL, The model of linear bounded Automata.

Unit 5: Turing Machine (8 hrs)

The Turing machine – Notation for TM, Instantaneous description for TM , Transition diagram for TM, The language of a TM, Design of Turing Machines, Church Turing Thesis, TM and halting, Extensions to the basic TM: Multitape TM, Nondeterministic TM, Universal TM.

Unit 6: Decidability and Undecidability(4 hrs)

Decidable problems,Decidable problems concerning Regular Language, Undecidable Problems, Simple Un-decidable Problem: Post Correspondence Problem, Intractable Problems: Classes P and NP.

Text Books:

1. John E. Hopcroft , Rajeev Motwani , Jeffrey D. Ullman, "Introduction to Automata Theory Languages, and Computation" 3rd ed. , Pearson Education, ISBN: 81-317-1429-2
2. K.L.P. Mishra, N. Chandrasekaran, "Theory of Computer Science: Automata, Languages and Computation" 3rd ed. , PHI , ISBN : 978-81-203-2968-3
3. John C Martin, "Introduction to Languages and the Theory of Computation", 3rd ed., Tata McGraw Hill, ISBN: 0-07-066048-4)

Reference Books:

1. Michael Sipser, Introduction to the Theory of Computation, CENGAGE Learning, 3rd Edition ISBBN-13:978-81-315-2529-6.
2. Basavaraj S. Anami, Karibasappa K. G. , " Formal Languages and Automata Theory" Wiley Publication, ISBN : 978-81-265-2010-7

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FACULTY OF SCIENCE AND TECHNOLOGY
Third Year Engineering (CSE/IT)
Semester – I

Course Code: CSE303 **Title: Database Management System**

Teaching Scheme
Theory: 04 Hours/Week

Examination Scheme
Class Test: 20 Marks
Theory Examination (Marks): 80 Marks
Theory Examination (Duration): 03 Hours

Prerequisites:

1. Programming Concepts
2. Discrete Mathematics
3. Object Oriented Programming

Objectives:

1. To understand the different issues in the design and implementation of a database system
2. To design and build simple database systems
3. To retrieve information efficiently and effectively from database

CONTENTS

SECTION-A

Unit 1: Introduction (06 hrs)

- DBMS and Database System Applications
- Purpose of Database Systems
- View of Data
    - Data Abstraction
    - Instances and Schemas
    - Data Models
- Database Languages
    - DDL, DML
- Database Architecture
- Database Users and Administrators
- History of Database Systems.

Unit 2: Introduction to Database Design (08 hrs)

- Database Design and ER diagrams
    - Beyond ER Design
- Entities, Attributes And Entity sets
- Relationships and Relationship sets
- Additional features of ER Model

    - Key Constraints
    - Participation Constraints
    - Weak Entities
    - Class Hierarchies
    - Aggregation
- Conceptual Design with the ER Model
    - Entity versus Attribute
    - Entity versus Relationship
    - Binary versus Ternary Relationships
    - Aggregation versus Ternary Relationships
- Case Study : The Internet Shop

Unit 3: Relational Model (06 hrs)

- Relational Model Concepts
    - Domains, Attributes, Tuples and Relations
    - Characteristics of Relations
- Relational Model Constraints
    - Domain Constraints
    - Key Constraints and Constraints on Null Values
    - Relational Databases and Relational Database Schemas
    - Entity Integrity, Referential Integrity and Foreign Keys
- Relational Database Design Using ER-to-Relational Mapping

SECTION-B

Unit 4: Relational Algebra and SQL (06 hrs)

- Relational Algebra
    - Selection and Projection
    - Set operations
    - Renaming
    - Joins
    - Examples of Algebra Queries
- SQL
    - SQL Data Definition
    - Specifying Constraints in SQL
    - Form of Basic SQL Query
    - Joins
    - Nested Queries
    - Aggregate Operators
    - NULL values
    - Views
    - Active Databases

Unit 5: Functional Dependencies and Normalization (06 hrs)

- Functional Dependencies
    - Definition of Functional Dependency
    - Inference Rules for Functional Dependencies
    - Equivalence of Sets of Functional Dependencies
    - Minimal Sets of Functional Dependencies
- Normal Forms based on Primary Keys
- General Definitions of Second and Third Normal Forms
- Boyce-Codd Normal Form
- Properties for Relational Decompositions
- Multi-valued Dependencies and 4NF
- Join Dependencies and 5NF

Unit 6: Transaction Management (08 hrs)

- Transaction Support
    - Properties of Transactions
- Concurrency Control
    - The Need for Concurrency Control
    - Serializability and Recoverability
    - Locking Methods
    - Deadlock
    - Timestamping Methods
- Database Recovery
    - The Need for Recovery
    - Transactions and Recovery
    - Recovery Facilities
    - Recovery Techniques

Text Books:

1. Ramez Elmasri and Shamkant B. Navathe, "Fundamentals of Database Systems", 5th Edition, Pearson Education
2. Abraham Silberschatz, Henry F. Korth, S. Sudarshan, "Database System Concepts", 6th Edition, McGraw Hills
3. Raghu Ramakrishnan, Johannes Gehrke, "Database Management Systems", 3rd Edition, TATA McGraw Hill, 2003

Reference Books:

1. Thomas Connolly, Carolyn Begg "Database Systems, A Practical approach to Design implementation and Management", Third Edition, , Pearson Education

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FACULTY OF SCIENCE AND TECHNOLOGY
Third Year Engineering (CSE/IT)
Semester – I

Course Code: CSE304 **Title: Programming in Java**

Teaching Scheme
Theory: 4 Hours/Week

Examination Scheme
Class Test: 20 Marks
Theory Examination (Marks): 80 Marks
Theory Examination (Duration): 03 Hours

Prerequisite:
1. Basics of programming languages.
2. Concepts of Object Oriented Programming languages.

Objectives:
The students will be able to:
1. Apply object oriented features to real time entities.
2. Handle exceptions & implement multithreaded programs.
3. Implement database programming.
4. Design & implement GUI with event handling
5. Develop I/O & networking programs.

CONTENTS

SECTION-A

Unit 1: Introduction (8 Hours)

- Features of Java, Java Virtual Machine, Byte Code, JIT Compiler
- Class fundamentals, Declaring objects, Nested and Inner Classes, Introducing Methods, Constructors, Garbage Collection
- Overloading Methods, Using Objects as Parameters, Returning Objects, Access Control, Understanding static & final keyword,
- Inheritance Basics, Using Super, Method Overriding, Abstract Classes, Using final keyword with inheritance
- Arrays, Vectors, Strings, Wrapper classes
- Using Command-Line Arguments

Unit 2: Packages & interfaces (6 Hours)

- **Packages:** Defining a Package, Finding Packages and CLASSPATH, A Short Package Example, Access Protection, Importing Packages

- Study of java.lang & java.util packages
- **Interfaces:** Defining an Interface, Implementing Interfaces, Variables in Interfaces, Extending Interfaces,
- Multiple Inheritance

Unit 3: Exception Handling & Multithreaded Programming (6 Hours)

- Exception handling fundamentals, Exception Types, Using try-catch, Multiple try-catch clauses, Nested try statements, throw, throws, finally, Built-in Exceptions, creating your own exception subclasses
- The Java Thread Model, The Main Thread, Creating a Thread , Creating Multiple Threads, Using isAlive( ) and join( ), Thread Priorities, synchronization, Suspending, Resuming, and Stopping Threads

SECTION-B

Unit 4: Java Database Connectivity (4 Hours)

- Introduction, Types of JDBC Drivers , Driver interface & DriverManager class, Connection Interface , Statement Interface, PreparedStatement , ResultSet,
- JDBC Program for executing Statements & processing ResultSet ,Using PreparedStatement

Unit 5: Applet, Event Handling and AWT (10 Hours)

- **Applet:** Applet Basics, An Applet Skeleton, Simple Applet Display Methods, Using the Status Window, The HTML APPLET Tag, Passing Parameters to Applets
- **Event Handling:** The Delegation Event Model, Event Classes, Sources of Events, Event Listener Interfaces, Handling Mouse and Keyboard Events, Adapter Classes
- Introduction to AWT , AWT classes, Window, Creating a Frame Window in an Applet,Working with Graphics

Unit 6: Input /Output & Networking (6 Hours)

- **Input /Output:** I/O Basics, Reading Console Input, Writing Console Output, The PrintWriter Class, Reading and Writing Files, The Stream Classes, The Byte Streams, The Character Streams, Object Serialization & deserialization
- **Networking:** Networking Basics, The Networking Classes and Interfaces, TCP/IP Client Sockets, TCP/IP Server Sockets, Datagrams

Text / Reference Books:

1. Herbert Schildt , The Complete Reference- Java2 ,(Seventh Edition), Tata Mc Graw Hill
2. Steven Holzner , Java 2 Black Book,DreamTech Press
3.Deitel & Deitel ,Java: How to Program , PHI
4. Bert Bates, Kathy Sierra , Head First Java, O'Reilly Media, Inc.
5. E Balagurusamy , Programming with Java, Tata Mc Graw Hill

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FACULTY OF SCIENCE AND TECHNOLOGY
Third Year Engineering (CSE/IT)
Semester – I

Course Code: CSE341 **Title: Computer Network Architecture and Protocols (Elective-I)**

Teaching Scheme
Theory: 04 Hours/Week

Examination Scheme
Class Test: 20 Marks
Theory Examination (Marks): 80 Marks
Theory Examination (Duration): 03 Hours

Prerequisite:

1. Computer fundamentals
2. Computer Networks

Objectives:

1. To understand fundamental concepts of computer networking and functionality of layered network architecture.
2. To understand wireless and mobile networking concepts
3. To apply networking concepts to various situations, classifying networks, analyzing performance of computer network infrastructure.

CONTENTS

SECTION-A

Unit I : Network Layer (6 Hrs)
Design issues, IPv4, Problems with IPv4, strategies to bridge the limitations (IP subnetting, CIDR, DHCP, NAT), Network design with CIDR, IPv6.

Unit II: Network Layer Protocols (6 Hrs)
Routing algorithms: Unicast protocols: RIP, EIGRP, OSPF, BGP and multicast routing protocols, ICMP, IGMP, DHCP

Unit III: Transport Layer Protocols (8 Hrs)
Services, Transport layer protocols, UDP, TCP, SCTP: State Transition diagram, flow control, error control, socket programming.

SECTION-B

Unit IV : ATM Networks (8 Hrs) Design goals, Problems, Architecture and ATM Switching, ATM layers, Congestion Control and Quality of Service, ATM LAN's, LAN Architecture, LAN Emulation client server model

Unit V :Wireless Networks and Protocols (6 Hrs)

Link Layer: IEEE 802.11 WLAN protocols, CSMA/CA, Wireless Application Protocol, Routing Protocols & Location Awareness Strategies in Wireless Networks, Resource Allocation and management in Wireless Networks, TCP over wireless network.

Unit VI: Applications (6 Hrs)

Traditional Applications Telnet, SSH, SNMP: SMI, MIB, Multimedia: RTP, RTTP, VOIP, SIP, H.323.

Text Books:

1. B. A. Forouzan, "Data Communications and Networking", 5th Edition, Tata McGraw-Hill.
2. A S Tanenbaum, "Computer Networks", 4th Edition, Pearson Education.
3. Vijay K Garg, Wireless Communications and Networking, Morgan Kaufmann.

Reference Books:

1. William Stallings, "Data and computer Communication", 7th Edition, Pearson Education.
2. Larry L Peterson and B S Davie, Computer Networks: A Systems Approach, Elsevier.
3. B. A. Forouzan, "TCP/IP Protocol Suite", 4th Edition, Tata McGraw-Hill.

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FACULTY OF ENGINEERING AND TECHNOLOGY
Third Year Engineering (CSE/IT)
Semester – I

Course Code: CSE342 **Title: Digital Image Processing (Elective-I)**

Teaching Scheme
Theory: 4 Hours/Week

Examination Scheme
Class Test: 20 Marks
Theory Examination (Marks): 80 Marks
Theory Examination (Duration): 03 Hours

Prerequisite:

The Students should have knowledge of

1. Elements of visual perception
2. Basic linear algebra and Fourier transform
3. The sampling theorem, quantization.
4. Set theory

Objectives:

1. Students should be able to understand digital image processing beyond the fundamental level.
2. To study complete digital image processing steps.
3. Students should be able to choose appropriate image processing algorithm to achieve desired result.
4. Students should be able to properly implement DIP algorithms using modern computing tools such as MATLAB, interpret and present the results.

CONTENTS

SECTION-A

Unit 1: Digital Image Fundamentals (08 Hours)

- Introduction: Image, Pixel, Digital image
- Fundamental Steps and Components of Digital Image Processing
- Brightness adaption and discrimination
- Image sensing and Acquisition
- Image Sampling and Quantization: Basic Concepts in Sampling and Quantization, Representing Digital images, Spatial and intensity resolution
- Relationships between pixels: Neighbors of a Pixel, Adjacency, Connectivity, Regions and Boundaries, Distance Measures.
- Basic Intensity Transformation: Image Negatives, Log transformation, Power law Transformation, Piecewise Linear Transformation
- Histogram processing: Definition, Histogram Equalization
- Image Transforms: Discrete Fourier transform(DFT), DCT, Walsh Hadamard Transform.

Unit 2: Image Enhancement (06 Hours)

Spatial Domain Methods:

- Fundamentals of Spatial Filtering: Mechanics of Spatial Filtering, Generating Spatial Filter Masks
- Noise Model
- Smoothing Spatial Filters: Linear filters – Mean filters, Non-linear (Order Statistic) spatial filters: Median, Mode, Max, Min filters
- Sharpening spatial Filters: Foundation, Using First Order Derivatives for image sharpening – The Gradient, Using Second Order Derivatives for image sharpening – The Laplacian, Unsharp Masking, High-Boost Filtering

Frequency Domain Methods:

- Image Enhancement by Frequency domain methods: Basic steps for filtering in Frequency Domain.
- Frequency Domain low pass (Smoothing) and high pass (Sharpening) Filters

Unit 3: Image Compression (06 Hours)

- Fundamentals
- Coding Redundancy, Spatial and Temporal (Interpixel) Redundancy, Irrelevant Information (Psychovisual Redundancy)
- Measuring Image Information: Entropy, Fidelity Criteria, Image Compression Model
- Some Basic Compression Methods: Losssless Compression Methods: Huffman coding, LZW coding, Run length coding, Lossy Compression Techniques: Block transform Coding
- Image File Formats: BMP, GIF, TIFF
- Image Compression Standards: Binary Image Compression Standards, Continuous Tone Still Image Compression Standards

SECTION-B

Unit 4: Image Segmentation (08 Hours)

- Fundamentals: Point, Line, Edge Detection, Detection of Isolated Points, Line Detection
  Edge Models, Basic Edge detection, Canny edge detector
- Thresholding: Foundation, Basic Global thresholding, Optimal global thresholding, Multiple thresholds, Multivariable Thresholding
- Region-based Segmentation Methods: Region Growing, Region Splitting and Merging,
- Segmentation using Morphological watersheds

Unit 5: Morphological Image Processing and Color Image Processing (06 Hours)

Morphological Image processing:

- Preliminaries, Erosion and dilation, opening and closing
- The Hit-or-Miss Transformation

- Some Basic Morphological Algorithms: Boundary extraction, Region filling, thinning

Color Image processing:

- Color Fundamentals and color models
- Basics of Full color image processing
- Color transformations

Unit 6: Image Representation and Description (06 Hours)

- Representation
- Boundary Descriptors
- Regional Descriptors

Object Recognition:

- Patterns and pattern Classes
- Recognition based on Decision Theoretic Methods

Text Books:

1. Rafael C. Gonzalez, Richard E. Woods, "Digital Image Processing", Third Edition, Pearson Education.
2. S. Jayaraman, S. Esakkirajan, T. Veerakumar "Digital Image Processing", McGraw Hill Publication.
3. Rafael C. Gonzalez, Richard E. Woods, Eddins, "Digital Image Processing using MATLAB", Pearson Education.

Reference Books:

1. Anil K. Jain, "Fundamentals of Digital Image Processing", PHI
2. B. Chanda, Dutta Majumdar, "Digital Image Processing and Analysis", PHI

PATTERN OF QUESTION PAPER:

Six units in the syllabus shall be divided in two equal parts i.e. 3 units in each part. Question paper shall be set having two sections A and B. Section A questions shall be set on first part and Section B questions on second part. Question paper should cover the entire syllabus.

For 80 marks Paper:

1. Minimum ten questions
2. Five questions in each section
3. Question no. 1 from section A and Question no. 6 from section B, 10 marks each, will be compulsory.
4. From the remaining questions in section A and B students are supposed to solve any two questions, 15 marks each

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Third Year Engineering (CSE/IT)
Semester – I

Course Code: CSE343 **Title: Embedded Systems (Elective-I)**

Teaching Scheme
Theory: 4 Hours/Week

Examination Scheme
Class Test: 20 Marks
Theory Examination (Marks): 80 Marks
Theory Examination (Duration): 03 Hours

Prerequisite:
1. Knowledge of Microprocessor/Microcontroller
2. Knowledge of Computer Organization and Architecture

Objectives:
1. Understanding embedded system, processor & Embedded systems architecture.
2. Be familiar with Embedded Devices and Platforms.
3. Understanding Real Time system, Real time task scheduling & Real time operating system.
4. Understand concept of Embedded Linux and Network Configuration.

CONTENTS

SECTION-A

Unit 1: Introduction to Embedded Systems (6 Hours)
Architecture, Classification and Characteristics of Embedded System, Typical Components of embedded systems. Design Process, Design Metrics and optimization of various parameters of embedded system. Programming of Embedded Systems, assembly language vs embedded C Programming. Components of Embedded hardware and embedded software. Case study of Digital Camera.

Unit 2: Embedded Processors (6 Hours)
Difference between microprocessors and microcontrollers. 8 bit and 32 bit, processors, architecture of 8-bit 8051 microcontroller and its features. ARM processor family, Difference between RISC and CISC architectures. Architecture of ARM7 and comparison of 8051 and ARM7 architecture. Introduction to ARM7 TDMI architecture, 32-bit pipelined architecture. CPSR and SPSR, VIC in ARM7, memory management and bus architecture.

Unit 3: Embedded Devices and Platforms (8 Hours)
Different IO interfaces and communication protocols used in embedded systems,

I/O Devices like Parallel Ports, ADC, DAC, keypad and LCD. Communication interfaces Serial Communication vs parallel communication,
Communication Protocols : Bluetooth/zigbee, SPI and I2C protocols. RS232, RS485, CAN and USB as host and USB Device. Latest Embedded Development Platform (introduce board Details, features and Applications of) mbed, Arduino Uno, Raspberry Pi (versions) beagle bone black.
Project Case Study: Complete Temperature Controller Design, including Arduino board, 16x2 LCD, LM35 Temperature Sensor, Relay for Turning On/off a DC Fan, switches / keypad to enter the setpoint.

SECTION-B

Unit 4:: Introduction to Real Time Operating Systems (8 Hours)
RTOS services in contrast with traditional OS, Architecture of the kernel, Tasks and Task states in RTOS (idle, wait,ready), Clock Tick, Task Scheduler, Interrupt service routine, Semaphore, Mutex, mailboxes, Message Queues, Event Registers, Pipes, Signals, Timers, Socket Functions, RPC Functions, Memory Management, Priority Inversion problem.

Unit 5:: Micro-Controller Real-time Operating Systems (6 Hours)
Off-the-shelf operating system, Embedded Operating System, Introduction to uCOS-II RTOS, Salient Features of uCOSII, Study of kernel structure of uCOSII, Synchronization in uCOS-II,semaphore management, mutual exclusion semaphores, event flag management, Inter-task communication in uCOS-II, message mailbox management in uCOS-II

Unit 6: Embedded Linux (6 Hours)
Introduction to the Linux kernel, Configuring and booting the kernel, The root file system, Root file directories, /bin, /lib etc., Linux file systems, Types of file system: Disk, RAM, Flash and Network
Some debug techniques- Syslog and Strace, GDB, TCP/IP Networking- Network configuration

Text Books:
1. Dr. K.V.K.K. Prasad, “Embedded /Real-Time System: Concepts, Design & Programming”, Dreamtech, Edition 2010.
2. Raj kamal, “Embedded Sytems: Architecture, Programming and Design”, TMH.
3. Andrew. N. Sloss, DomnicSymes, Chris Wright, “ARM System Developer’s Guide”, Elsevier, edition 2004.
4. Mohamed Ali Mazidi, Janice Gillispie Mazidi, Rolin McKinlay, “The 8051 Microcontroller and Embedded Systems: Using Assembly and C”, Second Edition, Pearson Education, 2011
5. KarimYaghmour , “Building Embedded Linux Systems”, 2003 O'Reilly & Associates,
6. Jean Labrosse “MicroC/OS-II The Real Time Kernel” CMP Books 2nd Ed.

Reference Books:
1. David Simon, “Embedded systems software primer”, Pearson

2. Steve Furber, “ARM System-on-Chip Architecture”, Pearson
3. Matt Richardson“Getting Started with Raspberry Pi” , 2nd Edition.

PATTERN OF QUESTION PAPER:

Six units in the syllabus shall be divided in two equal parts i.e. 3 units in each part. Question paper shall be set having two sections A and B. Section A questions shall be set on first part and Section B questions on second part. Question paper should cover the entire syllabus.

For 80 marks Paper:

1. Minimum ten questions
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3. Question no. 1 from section A and Question no. 6 from section B, 10 marks each, will be compulsory.
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Third Year Engineering (CSE/IT)
Semester – I

Course Code: CSE321 **Title: LAB – I Database Management System**

Teaching Scheme
Practical: 02 Hours/week

Examination Scheme
Practical /Oral Examination (Marks): 50 Marks
Practical /Oral Examination (Duration): 03 Hours

Suggestive List of Practical Assignments:

Design, develop and implement any ten assignments from the following in SQL using Oracle/DB2 environment.

Assignment No.: 1

Implementation of DDL and DML Commands of SQL with suitable example

Assignment No.: 2

Implementation of different types of SQL functions with suitable example

- Number Function
- Character Function
- Aggregate Function
- Conversion Function
- Date Function

Assignment No.: 3

Implementation of different types of SQL operators with suitable example

- Arithmetic operators
- Logical operators
- Comparison Operators
- Special operators
- Set operators

Assignment No.:4

Study and Implementation of different types of Constraints

Assignment No.:5

Implementation of different types of joins

- Equijoin
- Non Equijoin
- Outer join

- Self join

Assignment No.:6

Study and implementation of:

- Group by & Having Clause
- Order by
- Indexing

Assignment No.:7

Study and implementation of:

- Sub queries
- Views
- Sequences

Assignment No.:8

Study and implementation of:

- TCL commands : Rollback, Commit, Save point
- DCL commands : Grant, Revoke, Creating & Managing users

Assignment No.:9

Study and Implementation of PL/SQL Block

Assignment No.: 10

Study and Implementation of PL/SQL Exceptions

Assignment No.:11

Study and Implementation of Triggers

Assignment No.:12

Study and Implementation of Cursors

Note: It is compulsory for the Students to perform one additional application based on assignment which should cover maximum possible queries.

Practical Examination:

Practical Examination should be conducted by internal examiner for three hours under the supervision of external examiner. External examiner should evaluate student by checking practical performance and conducting viva.

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Semester – I

Course Code: CSE322 **Title: LAB-2 Programming in Java**

Teaching Scheme
Practical: 2 Hours/Week

Examination Scheme
Practical /Oral Examination: 50 Marks
Practical /Oral Examination (Duration): 03 Hours

Suggestive List of Practical Assignments:

Design, develop and implement the following Assignments.

1. Write a program to demonstrate basic syntactical constructs of java.
    a> Operators & Expressions
    b> Looping Statement
    c> Decision Making Statement
2. Write a program to define a class, descried its constructor & overload its constructor.
3. Write a program to implement inheritance & demonstrate use of method overriding & various access controls.
4. Write a program to implement Multiple Inheritance with interfaces.
5. Write a program to create a package & use it in another program.
6. Write a program to implement exception handling using built-in & user defined exceptions.
7. Write a program to implement concept of multithreading.
8. Write a program for database connectivity using JDBC.
9. Write a program using Applet to demonstrate parameter passing.
10. Write a program to implement event handling
11. Write a program to implement object Serialization & deserialization.
12. Write a program to implement socket programming.

Practical Examination:

Practical Examination should be conducted by internal examiner for three hours under the supervision of external examiner. External examiner should evaluate student by checking practical performance and conducting viva.

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Semester – I

Course Code: CSE 323 **Title: LAB-3: Computer Network Architecture and Protocols (Elective-I)**

Teaching Scheme	**Examination Scheme**
Practical: 02 Hours/Week	Term Work: 50 Marks

Suggestive List of Practical Assignments:

Design, develop and implement the following Assignments …....

Assignment No.: 1 :- Study of Basic Networking commands
Assignment No.: 2 :- Implementing IPV4 and IPV6 addressing.
Assignment No.: 3 :- Configure a network using RIP protocol.
Assignment No.: 4 :- Configure a network using EIGRP protocol.
Assignment No.: 5 :- Configure a network using OSPF protocol.
Assignment No.: 6 :- Configure a network using BGP protocol.
Assignment No.: 7 :- Implementing client-server model using socket programming.
Assignment No.: 8 :- Implement Wi-Fi network and study wireless protocols.
Assignment No.: 9 :- Remote login by using SSH or Telnet.
Assignment No.: 10 :- Design an enterprise network by using simulator.

TERM WORK

The term work shall consist of at least 8 experiments/ assignments based on the syllabus above.
Assessment of term work should be done as follows:

- Continuous lab assessment.
- Actual practical performance in Laboratory.
- Oral Examination conducted (internally) at the time of submission.

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Semester – I

Course Code: CSE324 **Title: LAB-3: Digital Image Processing (Elective-I)**

Teaching Scheme **Examination Scheme**

Practical: 02Hours/Week Term Work: 50 Marks

Suggestive List of Practical Assignments:

Implement the following Assignments using MATLAB/SCILAB/OCTAVE/JAVA

Assignment No.: 1 Image Enhancement using point processing methods

Assignment No.: 2 Image Enhancement using spatial domain methods.

- Smoothing Filters
- Sharpening Filters

Assignment No.: 3 Image Enhancement using low pass filter in frequency domain methods

- LowPass Filters
- HighPass Filters

Assignment No.: 4 Demonstration of image compression Methods

- Lossless Compression methods
- Lossy Compression methods

Assignment No.: 5 Demonstration of Image Segmentation Methods

- Threshholding methods
- Region Based Methods

Assignment No.: 6 Morphological image operations- erosion, dilation, opening and closing.

Assignment No.: 7 Programs for illustrating color image processing

Assignment No.: 8 Programs for region description and boundary representation.

Assignment No.: 9 Program for object recognition

Assignment No.: 10 Case studies

Guidelines for case studies:

- Group of 2-3 Students should select real life DIP problem Domain And implement any of its DIP module.
    - Problem Domains
        - Biometric Imaging
        - Medical imaging
        - Satellite imaging etc
    - DIP Modules
        - Image enhancement
        - Image Segmentation etc

OR

- Group of 2-3 Students should study any recent international journal research paper based on DIP/Computer vision

TERM WORK

The term work shall consist of at least 8 experiments/ assignments based on the syllabus above and a group of 2-3 students must prepare and present a case study.

Assessment of term work should be done as follows::

- Continuous lab assessment
- Actual practical performance in Laboratory.
- Oral Examination conducted (internally) at the time of submission.

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Semester – I

Course Code: CSE325 **Title: LAB-3 Embedded Systems (Elective-I)**

Teaching Scheme **Examination Scheme**

Practical: 2 Hours/Week Term Work: 50 Marks

Suggestive List of Practical Assignments:

1. Arduino IDE installation and testing of simple blink program
2. Write a program to interface 8 LEDs with Arduino and make them ON and OFF
3. Interface 2 switches with Arduino and write a program for blinking LEDs when switch is pressed
4. Interface 1 switch with Arduino and write a program to count the number of switch presses and print it on serial port
5. Interface LM35 Temperature Sensor with Arduino and print temperature on serial terminal
6. Interface DHT11 Sensor with Arduino and print humidity / temperature on serial terminal
7. Interface a 16x2 LCD with Arduino and print temperature on it
8. Interface a micro servo motor with Arduino and write a program to rotate it clockwise (0-180 degree) and anticlockwise (180degree to 0)
9. Interface a moisture sensor with Arduino and write a program to turn on LEDs when the moisture is dry and turn it off when there is enough moisture
10. Interface a memory card and create a data logger with Arduino
11. Install Operating System (Raspbian) on a raspberry Pi 3 Board, update the OS, change time zone and keyboard layout
12. Install GPIO libraries and interface 4 LEDs with Raspberry pi and perform an LED blink program in Python
13. Interface a DHT22 Sensor with Raspberry Pi and send temperature and humidity as email using Python
14. Create a text to speech module using python and speech synthesis library to create a talking thermometer

Note: Students should perform at least 10 Assignments.

TERM WORK

The term work shall consist of at least 8 experiments/ assignments based on the syllabus above.
Assessment of term work should be done as follows:

- Continuous lab assessment.
- Actual practical performance in Laboratory.
- Oral Examination conducted (internally) at the time of submission.

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Semester – I

Course Code: CSE326 **Title: Lab IV Software Development Lab I (ASP .NET using C#)**

Teaching Scheme
Practical: 02 Hours/Week

Examination Scheme
Practical / Oral Examination (Marks): 50 Marks
Practical / Oral Examination (Duration): 03 Hours

Prerequisite:
1. Programming in C / C++
2. HTML, Javascript
3. MySQL

Objectives:
1. To learn C# features
2. To Perform database operations using ADO.Net and exception handling
3. To learn different server controls of asp.net
4. To learn navigation, session, cookies, event handling
5. To learn web services

CONTENTS

SECTION-A

Unit 1: Introduction to the ASP .NET Framework and C# (03 Hours)
Introduction To Visual Studio IDE, ASP .NET & the .NET Framework , Introduction to C#, Data Types, Variables and expressions, control statements , functions, namespaces, Assembly, Components of Assembly, Private and Shared Assembly

Unit 2: Web Application with ASP.NET (04 Hours)
Introduction to Web Applications, ASP.NET page lifecycle, Server Side Controls, Client Side Controls, Basic Controls ,Validation Controls , Master &Content Pages in ASP .NET

Unit 3: Web Application with ASP.NET (03 Hours)
Navigation Controls, State management techniques - Session , Query string, Cookies, View State , Event Handling, Creating and deploying web services, Deployment of Web Application

SECTION-B

Unit 4: Database Handling (03 Hours)
ADO.NET, Static and Dynamic Data Binding, ADO.NET architecture, data control, data source control, Introduction to Language Integrated Query (LINQ), Querying a Database with LINQ,

Unit 5: Introduction to SharePoint (03 Hours)
The Programming Model - The Evolution of SharePoint Programming, Challenges with CSOM in SharePoint 2010, Challenges with Server-Side Code.
Deployment Scenarios - On-Premise Deployment, Office 365 Deployment, Hosted Deployment, Hybrid Deployment.
The App Model - SharePoint-Hosted Apps, Provider-Hosted Apps, Azure Auto-Hosted Apps, The App Security Model.

Unit 6: Introduction to SharePoint Content Management (04 Hours)
Enterprise Content Management - Site Policies, Managed Meta Data.
Web Content Management, Search - The Structural Publishing Model, The Dynamic Publishing Model, Taxonomy-Driven Navigation, Term-Driven Publishing Pages, Cross-Site Publishing, Hostname Site Collections.

Text/Reference Books:
1. C# 2010 Programing, Black Book, Dreamtech Press
2. ASP.NET Unleashed 4, Stephen Walther,Nate Dudek,Kevin Hoffman, Pearson
3. Beginning Visual C# 2010, Karli Watson, Christian Nagel, Jacob Hammer Pedersen, Jon D. Reid, Morgan Skinner - WILEY
4. PROFESSIONAL SHAREPOINT 2013 DEVELOPMENT, Reza Alirezaei Brendon Schwartz Matt Ranlett Scot Hillier Brian Wilson Jeff Fried Paul Swider
5. Pearson Visual C# 2010 How to program. Prentice-Hall Inc, 2011, Fourth Edition

Suggestive List of Practical Assignments:
Design, develop and implement the following Assignments …....

1. Design & develop ASP.net Web Application using validation controls.
2. Design & develop ASP.net Web Application use master & content page.
3. Design a web form to insert, update, delete & show student information through database connectivity with (SQL/Oracle).
4. Create a web service and use it in web site.
5. Design & develop ASP.net Web Application using session.
6. Call an external web service through SharePoint workflow.
7. Create custom action using SharePoint workflow.
8. Create a simple Calculator using SharePoint workflow.
9. Create a Web forms application that integrated with Office 365.

10. Create a web form application for building Resume.
11. Mini Project.

Practical Examination:

Practical Examination should be conducted by internal examiner for three hours under the supervision of external examiner. External examiner should evaluate student by checking practical performance and conducting viva.

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Third Year Engineering (CSE/IT)
Semester – I

Course Code: BSH305 **Title: Communication Skill-II**
Teaching Scheme **Examination Scheme**
Theory: 02Hours/Week **Term Work: 50 Marks**

Prerequisite:
1. Basic Knowledge of Soft Skills
2. Good understanding of English

Objectives:
1. To imbibe leadership skills
2. To develop interpersonal Skills
3. To introduce corporate etiquettes
4. To imbibe team skills

CONTENTS

Unit 1: Understanding self and Goal Setting (5 Hours)
- Self-Assessment: Understanding Self Core Competency (SWOT/SWOC)
- Long term and short-term Goal Setting
- Execution Skills

Unit 2: Interpersonal Skills (6 Hours)
- Interpersonal Communication
- Conflict Management
- Problem Solving
- Decision Making
- Persuasion and Influence

Unit 3: Group Dynamics and Team Building (4 Hours)
- Group Vs Team
- Team Building
- Team Work
- Developing Leadership Skills

Unit 4: Corporate Etiquette (5 Hours)
- Clothing Etiquette, Personal hygiene and grooming
- Time Management

- Influencing Skills (Impression)
- Balancing personal and professional Life
- Ethics, Values and Laws

Text Book:

1. The Ace of Soft Skills (Gopalaswamy Ramesh) Pearson Publication

Reference Books:

1. Execution; :Ram Charan
(Publisher: Crown Business; 1 edition (June 15, 2002)
Language: EnglishISBN-10: 0609610570ISBN-13: 978-0609610572

2. Laws of Teamwork : John C Maxwell

3. Master of Business Etiquette: Cyrus Gonda
(Author: Cyrus Gonda, Publisher EMBASSY BOOKS, 2017, ISBN 9385492721, 9789385492723)

4. Goals :
(Author: Brain Tracy ISBN: 1-57675-235-6Published by Berrett-Koehler Publishers, Inc)

5. Interpersonal Skills at work :
(Author: John Hayes Second Edition: Routledge)

6. People Smart :
(Author: Freda Hansburgby Berrett-Koehler Publishers, Inc)

Term Work Assessment (50 marks):

The term work shall consist of internal online examination of 50 Marks, conducted at institute level. The marks of the examination shall be forwarded to the University.

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Third Year Engineering (CSE/IT)
Semester – II

Course Code: CSE351 **Title: Advanced Java**

Teaching Scheme **Examination Scheme**

Theory: 04 Hours/Week

Class Test: 20 Marks
Theory Examination (Marks): 80 Marks
Theory Examination (Duration): 03 Hours

Prerequisite:

1. Data Structure
2. Core Java
3. Basic Programming skills in C/C++

Objectives:

1. Develop skills in Enterprise Java
2. Understanding advanced concepts in Java Programming
3. Understanding importance of Service oriented Architecture of todays web application

CONTENTS

SECTION-A

Unit 1: Java Enterprise Edition (04 Hours)

Introduction, Overview of J2EE, J2EE Architecture 1 tire, 2 tire, and N tire, Standard Java EE Services, Java EE 8 features, Introduction to AJAX, Ajax using JSON. XMl, Intoduction to JAVA RMI

Unit 2: Servlet (08 Hours)

Servlet Overview and Architecture, Servlet API, Servlet Life Cycle, Working with ServletConfig and ServletContext, Handling HTTP, get Requests, Handling HTTP post Requests, Redirecting Requests to Other Resources, Session Tracking, Cookies, Session Tracking with HttpSession, Deployment descriptor, Building Java Projects with Maven

Unit 3: Java Server Pages (08 Hours)

JSP: Overview, Lifecycle, Architecture, JSP Elements: Directives, Scripting, Action tags, Implicit Objects, Comments, Custom Tags, Scope: page, request, session, JSP Exception handling

SECTION-B

Unit 4: Enterprise JavaBeans (06 Hours)

Understanding Enterprise JavaBeans, Types of beans, Creating a JavaBean, JavaBean Properties,, Stateful Session bean, Stateless Session bean, Entity bean.
Introduction to Java mail service,Component of JMS

Unit 5: Web Services (08 Hours)
SOAP Web Services: SOAP, WSDL, UDDI, ebXML, transport protocol, Writing SOAP web services, Invoking SOAP web services, JEE 7 for web service
RESTful Web Services: Resources and URIs, RESTful Web Services Specifications Overview, Java API for RESTful Web Services, JAX-RS 2.0, Writing RESTful Web Services, Invoking RESTful Web Services

Unit 6: Hibernate & Spring (06 Hours)
Hibernate: Architecture, component of Hibernate, Hibernate query language, Hibernate O/R mapping, Spring :Overview of Spring, Spring Architecture and Container, dependancy injection, Spring Web MVC Framework.

Text Books:
1. Antonio Goncalves, Beginning Java EE 6 Platform with GlassFish 3, Apress
2. Java Server Programming(Java EE 5) Black Book by Willey Publication
3. Subrahmanyam Allamaraju, Samir Tyagi, Karl Avedal, John Griffin, "Professional Java Server Programming", Wrox Publication.

Reference Books:
1. Java Platform, Enterprise Edition The Java EE Tutorial, Release 7, Eric Jendrock, Ricardo Cervera-Navarro, Ian Evans, Kim Haase, William Markito, 2014, Oracle
2. RESTful Java with JAX-RS 2.0, Second Edition by Bill Burke, Second Edition, O'REILLY

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FACULTY OF SCIENCE AND TECHNOLOGY
Third Year Engineering (CSE/IT)
Semester – II

Course Code: CSE352 **Title: Software Engineering**

Teaching Scheme
Theory: 4 Hours/Week

Examination Scheme
Class Test: 20 Marks
Theory Examination (Marks): 80 Marks
Theory Examination (Duration): 03 Hours

Prerequisite:

1. Students should have prior basic knowledge on Software attributes, Process models.
2. Students should have some basic knowledge on Testing, Maintenance.

Objectives:

1. This course is intended to provide the students with an overall view over Software Engineering discipline and with insight into the processes of software development.
2. To learn about generic models of software development process.
3. To understand the different design techniques and their implementation.
4. To learn various testing and maintenance measures.

CONTENTS

SECTION -A

Unit 1: Software Engineering – Overview (4 Hours)
Introduction–Characterstics of Sfotware Engineering, FAQs about software engineering – Professional and ethical responsibility – Socio-Technical systems – emergent system properties – System Engineering – Organizations – people and computer systems–Legacy systems.

Unit 2: Software Process Models (8 Hours)
The Evolving role of Software – Software – The changing Nature of Software – Legacy software — A generic view of process– A layered Technology – A Process Framework – The Capability Maturity Model Integration (CMMI) – Process Assessment – Personal and Team Process Models – Product and Process – Process Models – The Waterfall Model – Incremental Process Models – Incremental Model – The RAD Model – Evolutionary Process Models – Prototyping – The Spiral Model – The Concurrent Development Model – Specialized Process Models – the Unified Process.

Unit 3: Requirement Engineering (8 Hours)
Software Engineering Practice – communication Practice – Planning practice modeling practice– Construction Practice –Deployment. Requirements Engineering - Requirements Engineering tasks – Initiating the requirements Engineering Process- Eliciting Requirements

– Developing Use cases – Building the Analysis Models – Elements of the Analysis Model – Analysis pattern – Negotiating Requirements – Validating Requirements.

SECTION -B

Unit4:Analysis Modeling (5 Hours)
Requirements Analysis – Analysis Modeling approaches – data modeling concepts – Object oriented Analysis – Scenario based modeling – Flow oriented Modeling – Class based modeling – creating a behaviour model.

Unit5:Design & Testing (8 Hours)
Design Engineering – Design process -Design Quality-Design model-User interface Design – Testing strategies- Testing Tactics - strategies Issues for conventional and object oriented software-validation testing –system testing –Art of debugging – Project management.

Unit 6: Quality Asssurance (7 Hours)
Software evolution - Verification and Validation - Critical Systems Validation – Metrics for Process, Project and Product-Quality Management - Process Improvement –Risk Management Configuration Management – Software Cost Estimation

Text Books:

1. Roger S. Pressman, Software Engineering: A Practitioner's Approach, McGraw Hill International edition, Seventh edition, 2009.
2. Ian Sommerville, Software Engineering, 8th Edition, Pearson Education, 2008.

Reference Books:

1. Stephan Schach, Software Engineering, Tata McGraw Hill, 2007
2. Pfleeger and Lawrence Software Engineering: Theory and Practice, Pearson Education, second edition, 2001
3. Software Engineering Principles and Practice by Waman.S.Jawadekar, Tata McGraw Hill, 2004.

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1. Minimum ten questions
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DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY AURANGABAD
FACULTY OF ENGINEERING AND TECHNOLOGY
Third Year Engineering (CSE/IT)
Semester – II

Course code: CSE353 **Title: Design and Analysis of Algorithms**

Teaching Scheme
Lectures: 4 Hrs/Week

Examination Scheme
Class test: 20 Marks
Theory Examination (Marks): 80 Marks
Theory Examination (Duration): 03 Hours

Course objectives:

1. To build a solid foundation of the most important fundamental subject.
2. To study paradigms and approaches used to analyze and design algorithms and to appreciate the impact of algorithm design in practice.
3. To understand how to measure performance of any algorithm.

Prerequisite

1. Programming in C Language (Covered at FE level).
2. Discrete Mathematical Structure (Covered at SE level).
3. Data Structures (Covered at SE level).

CONTENTS

SECTION-A

Unit 1-: Fundamental concept of algorithm design & analysis (8 hrs)

- Algorithm: characteristics, specifications
- Writing Pseudo-Code
- Frequency count and its importance in analysis of an algorithm,
- Asymptotic Notations: Time complexity & Space complexity of an algorithm, Big 'O', '□' & 'Ω' notations, Best, Worst and Average case analysis of an algorithm.
- Analysis of searching algorithms: sequential, binary search,
- Analysis of sorting methods: bubble, insertion, selection, heap sort. Analysis of each sorting technique for best, worst and average case, Concept of Internal & External sorting.

Unit 2-: Divide and conquer algorithmic design method (6 hrs)

- Divide and conquer: basic algorithm and characteristics.
- Binary Search: method and analysis of binary search for best, worst and average case for searches.
- Quick Sort, Merge Sort : method and analysis of algorithms
- Finding the largest and smallest number in a list using DnC.

Unit 3-: Greedy Method (6 hrs)

- The Greedy Method: basic algorithm and characteristics.
- Fractional Knapsack Problem solving using greedy method.
- Optimal merge patterns and optimal storage on tapes.
- Job sequencing with deadlines.
- Huffman Coding : greedy method
- Minimum cost spanning trees: Prim's and Kruskal's Algorithm
- Single source shortest path

SECTION-B

Unit 4.1-: Dynamic Programming Method (6 hrs)

- Dynamic Programming Method: basic algorithm and characteristics.
- 0/1 Knapsack Problem solving using DP method.
- Multistage graphs
- All pair shortest Path
- Optimal binary search trees
- Travelling salesperson problem

Unit 4.2-: Tree traversal and graph traversal techniques (4 hrs)

- Tree traversal techniques
- Graph traversal techniques :DFS,BFS
- Connected components
- Bi-connected components & spanning trees

Unit 5-: Backtracking Method (4 hrs)

- Backtracking Method: basic algorithm and characteristics.
- Solving n-queens problem
- Sum of subsets problem
- Graph colouring
- Hamiltonian cycle (TSP)

Unit 6-: Branch and Bound technique (6 hrs)

- Branch and bound: basic algorithm and characteristics.
- Solving n-queens using branch & bound
- FIFO Branch and Bound & Least Cost Branch & Bound
- Least Cost Search
- 15-puzzle
- Solving Travelling salesperson problem using branch & bound

Text Books:

1. Ellis Horowitz, Sarataj Sahni, S.Rajasekaran, "Fundamentals of Computer Algorithms", Galgotia Pub.
2. Udit Agarwal," Algorithms, Design and Analysis", Dhanpat Rai & Co.

3. Hari Mohan Pandey, “Design Analysis and Algorithms”, An imprint of Laxmi Publications Pvt. Ltd.
4. Michael Goodrich, Roberto Tamassia. “Algorithm Design”, Wiley Student Edition

Reference books:

1. R1. Alfred V. Aho, John E. Hopcroft, Jeffrey D. Ullman , “The Design and Analysis of Computer Algorithms”, Addison Wesley
2. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, ” Introduction to algorithms”, MIT Press

PATTERN OF QUESTION PAPER:

Six units in the syllabus shall be divided in two equal parts i.e. 3 units in each part. Question paper shall be set having two sections A and B. Section A questions shall be set on first part and Section B questions on second part. Question paper should cover the entire syllabus.

For 80 marks Paper:

1. Minimum ten questions
2. Five questions in each section
3. Question no. 1 from section A and Question no. 6 from section B, 10 marks each, will be compulsory.
4. From the remaining questions in section A and B students are supposed to solve any two questions, 15 marks each.

DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY AURANGABAD
FACULTY OF ENGINEERING AND TECHNOLOGY
Third Year Engineering (CSE/IT)
Semester – II

Course code: ITD354 **Title: E-Business System**

Teaching Scheme
Lectures: 4 Hrs/Week

Examination Scheme
Class test: 20 Marks
Theory Examination (Marks): 80 Marks
Theory Examination (Duration): 03 Hours

Prerequisite:
1. Concepts of Website Development.
2. Concepts of Online Shopping.

Objectives:
1. To explain Basics of e-Business and e-Business Strategies
2. To classify the e-Business models
3. To describe the Architecture of basic e-Business model
4. To explain the CRM and SCM Process
5. To analyse the e-procurement models and security techniques

CONTENTS

SECTION A

Unit 1: Overview of e-Business and its Strategy: (06 Hrs)
An Overview of e-Business: Introduction to e-Business, e-Business vs e-Commerce, Characteristics of e-Business, Elements of an e-Business Solution, e-Business Roles and their Challenges, e-Business Requirements, Inhibitors of e-Business like Management, Financial, Security, Legal, and Technological Issues.
e-Business Strategy: Definition, Types of Strategies like Supply Chain Management, Marketing and IS, Strategic positioning, Levels of e-Business Strategy like Supply Chain, Line of Business and Corporate Level, Strategic Planning Process.

Unit 2: e-Business Models and Architecture: (06 Hrs)
e-Business Models: Definitions, Classifications of Business Models like Internet Enabled, Value Web, e-Business Enabled, Market Participants and Cybermediaries Business Models.
e-Business Architecture: Introduction, Trends Driving e-Business Architecture, New Customer Care Objectives, New Competitive Conditions, Fast moving Competitors, Problems Caused by Lack of Integration.

Unit 3: CRM and Selling Chain Management: (08 Hrs)
Customer Relationship Management: Basics, Definitions, Phases of CRM, CRM Process Competencies, Building a CRM Infrastruct

Selling Chain Management: Basics, Definitions and goals of Selling Chain Management, Order Acquisition Process, Elements of Selling Chain Infrastructure.

SECTION B

Unit 4: SCM and ERP: (06Hrs)

Supply Chain Management: Basics, Definitions, Intenet Enabled SCM - Interenterprise Integration, Supply Chain Planning, Supply Chain Execution, e-Supply Chain Fusion, Diagnosing Root Causes of Supply Chain Problems, Fixing Root Causes.

Enterprise Resource Planning: Basics and Elements, ERP Architecture Planning, Software Decision, Capabilities of COTS ERP Solutions.

Unit 5: e-Procurement and KM (06Hrs)

e-Procurement: e-Procurement Models, B2E: Purchasing and Requisitioning Applications, Corporate Procurement Portals, e-Procurement Infrastructure: Integrating Ordering, Fulfilment and Payment.

Knowledge Management: Elements of Knowledge Management Applications - Data Organization and Collection, Analysis and Segmentation, Real-Time Personalization, Infrastructure for Broadcast, Retrieval and Interaction, Performance Monitoring and Measurement.

Unit 6: E-Commerce Security System (08 Hrs)

Security threats in E-Commerce environment, Requirements for safe e-payments/transactions, Measures, Denial of services, Concepts of Encryption and Decryption, Encryption Techniques Symmetric and Asymmetric Algorithm, Security protocols in Internet, Secure electronic transaction, EDI, Payment Gateway, Digital signature, Secure E-Wallet, E-Commerce Act

Text Books:

1. Michael P. Papazoglou and Pieter M. A. Ribbers, 'e-Business organizational and Technical Foundations', Wiley India Edition.
2. Dr. Ravi Kalakota and Marcia Robinson, 'e-Business 2.0 roadmap for Success, Pearson Edition.
3. en.wikipedia.org/wiki/Business_process

Reference Books:

1. Daniel Amor, E-business (R) Evolution, 2nd Ed. Prentice Hall, New York 2002.

Note: Case Studies from the books, e-Office, amazon.com, flipkart.com, etc

Pattern of Question Paper:

Six units in the syllabus shall be divided in two equal parts i.e. 3 units in each part. Question paper shall be set having two sections A and B. Section A questions shall be set on first part and Section

For 80 marks Paper:

- Minimum ten questions
- Five questions in each section
- Question no. 1 from section A and Question no. 6 from section B, 10 marks each, will be compulsory.
- From the remaining questions in section A and B students are supposed to solve any two questions from each section, 15 marks each.

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Third Year Engineering (CSE/IT)
Semester – II

Course code: CSE354 **Title: Systems Programming**

Teaching Scheme
Lectures: 4 Hrs/Week

Examination Scheme
Class test: 20 Marks
Theory Examination (Marks): 80 Marks
Theory Examination (Duration): 03 Hours

Prerequisite
Data structures and Operating System

Objectives
Students will be able to

1. Understand concepts of system programming, machine language and assembly language
2. Understand concepts of lexical, syntax and semantic analysis
3. Understand assemblers, macros and macro call
4. Understand compilers, loaders, linkers, interpreters and debuggers

CONTENTS

SECTION –A

Unit-1. Introduction to System Programming (06 hrs)
Concept, historical development,components of system software, life cycle of source program, programming languages and language processors, fundamentals of language processing, symbol table, foundation of system software.

Unit-2. Assembler (06 hrs)
General design procedure, design the assembler, types of assemblers, one pass assembler, advanced assembly process, design of two pass assembler

Unit-3. Macro language and Macro processors (08)
Macro instructions, features of macro facility, macro instruction arguments, conditional macro expansion, macro call within macros, macro instruction defining macros Implementation- Implementation of restricted faculty : two pass algorithm, single pass algorithm, implementation of macro calls within macros, implementation within assembler.

SECTION –B

Unit-4. Loaders and Linkers (06)

Loaders scheme : "compile and go loaders", general loader schemes, absolute loaders, subroutine linkages, relocating loaders, direct linking loaders, other loader schemes, binders, linking loaders overlays, dynamic binders. Design of absolute loaders, design of direct linking loaders, linkers vs loaders.

Unit-5. Scanning and Parsing (06)

Programming language grammar, classification of grammar, ambiguity in grammatic specification, scanning, parsing, top down and bottom up parsing, language processor development tools

Unit- 6. Compilers, Interpreters and Debuggers (08)

Causes of large semantic gap, binding and binding times, data structure used in compiling scope rules, memory allocation, compilation of expression, compilation of control structure, code optimization.

Benefits of interpretation, overview of interpretation, classification of debuggers, dynamic/interactive debugger

Text Books

1. John J. Donovan, 'System Programming',Tata Mc- Graw Hill.
2. D. M. Dhamdhere, 'System Programming and operating system',Tata Mc- Graw Hill.
3. G. Sudha Sadashiv, 'Compiler design', SciTech.
4. Rajesh K. Maurya,'System Programming',Dreamtech.

Pattern of Question Paper:

Six units in the syllabus shall be divided in two equal parts i.e. 3 units in each part. Question paper shall be set having two sections A and B. Section A questions shall be set on first part and Section

For 80 marks Paper:

- Minimum ten questions
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- From the remaining questions in section A and B students are supposed to solve any two questions from each section, 15 marks each.

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Semester – II

Course Code: CSE391 **Title: Distributed Operating System (Elective –II)**

Teaching Scheme:
Theory: 04 Hours/Week

Examination Scheme
Class Test: 20 Marks
Theory Examination (Marks): 80 Marks
Theory Examination (Duration): 03 Hours

Prerequisite:
1. Operating System
2. Computer Network
3. Java Programming

Objectives:
1. To understand basic concepts and need of Distributed systems.
2. To provide students with contemporary knowledge in distributed systems.
3. To provide master skills to measure the performance of distributed algorithms.
4. To build up distributed system using distributed algorithms.
5. To equip students with skills to analyze and design distributed applications.

CONTENTS

SECTION-A

Unit 1: Introduction to Distributed Systems (06 Hours)
Definition, Issues, Goals, and Types of distributed systems, Distributed System Models. Case study of World Wide Web

Unit 2: Communication (06 Hours)
Inter-process communication (IPC): MPI, Remote Procedure Call (RPC): Design Issues of RPC,
Object Oriented Communication, Message Oriented Communication, Case study of Java RMI and CORBA

Unit 3: Synchronization (08 Hours)
Need of clock synchronization in Distributed system, Physical Clock Synchronization: Server-initiated, Client-initiated and Averaging Algorithms, Logical Clock Synchronization: Lamports and Vector Clock Algorithms, Comparative Performance Analysis of Physical Clock synchronization algorithms and logical Clock synchronization algorithms.
Classification of Mutual Exclusion Algorithm: Centralized Mutual Exclusion: Election

Algorithms, Distributed (Decentralized) Mutual Exclusion Algorithms, Classification of Decentralized Algorithms: Token Based Algorithms and Non-token based Algorithms.
Token Based Algorithms: Suzuki-Kasami's Broardcast Algorithms, Singhal's Heurastic Algorithm, Raymond's Tree based Algorithm.
Non Token based Algorithms: Ricart–Agrawala's Algorithm, Maekawa's Algorithm.

SECTION-B

Unit 4: Resource and Process Management (06 Hours)
Desirable Features of global Scheduling algorithm, Task assignment approach, Load balancing approach, load sharing approach. Introduction to process management, process migration, Threads: Worker-Dispatcher Model, Virtualization, Clients, Servers, Code Migration.
Case study of Java Applets

Unit 5: Consistency and Replication (06 Hours)
Introduction, Data-Centric and Client-Centric Consistency Models, Replica Management.

Unit 6: Distributed File System (08 Hours)
Introduction and features of DFS, File models, File Accessing models, File Sharing Semantics ,File-Caching Schemes, File Replication, Fault Tolerance, Case study of Hadoop distributed File System and Map reduce.

Text Books:
1. Andrew S. Tanenbaum and Maarten Van Steen, "Distributed Systems: Principles and Paradigms, 2nd edition, Pearson Education, Inc., 2007, ISBN: 0-13-239227-5.
2. Pradeep K Sinha, "Distributed Operating Systems : Concepts and design", IEEE computer society press.

Reference Books:
1. George Coulouris, Jean Dollimore, Tim Kindberg, "Distributed Systems: Concepts and Design" (4th Edition), Addison Wesley/Pearson Education.
2. Sunita Mahajan, Seema Shah, "Distributed Computing", 2nd Edition, Publisher: Oxford University Press.
3. Advanced concepts in Operating Systems, Mukesh Singhal & N.G.Shivaratri, TMH.

PATTERN OF QUESTION PAPER:
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For 80 marks Paper:
1. Minimum ten questions

2. Five questions in each section
3. Question no. 1 from section A and Question no. 6 from section B, 10 marks each, will be compulsory.
4. From the remaining questions in section A and B students are supposed to solve any two questions, 15 marks each.

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Third Year Engineering (CSE/IT)
Semester – II

Course Code: CSE392 **Title: Artificial Intelligence (Elective-II)**

Teaching Scheme
Theory: 4 Hours/Week

Examination Scheme
Class Test: 20 Marks
Theory Examination (Marks): 80 Marks
Theory Examination (Duration): 03 Hours

Prerequisite:
1. Discrete Mathematics
2. Knowledge of any programming language
3. Data structures

Objectives:
The student should be made to
1. Study the concepts of Artificial Intelligence.
2. Learn the methods of solving problems using Artificial Intelligence.
3. Introduce the concepts of Expert Systems and machine learning.
4. To be familiar with the applicability, strengths, and weaknesses of the basic knowledge representation, problem solving, machine learning, knowledge acquisition and learning methods in solving particular engineering problems**.**

CONTENTS

SECTION-A

Unit 1: Introduction (6 Hrs)
Introduction to AI, Foundation of AI, History, AI Techniques, AI Problems, Production systems, Problem characteristics, Production System Characteristics, Issues in the Design of Search Problems

Unit 2: Heuristic Search and Knowledge Representation (6 Hrs)
Heuristic search, Hill Climbing, Best firth search, Problem Reduction, Means-Ends Analysis, Representations and Mapping, Knowledge Representation, issues in Knowledge Representation, Representing simple facts in logic, representing instance and ISA relationships, Computable functions and predicates.

Unit 3: Logic Programming (8 Hrs)
Procedural Versus Declarative Knowledge, Logic Programming, Forward and backward reasoning, Forward and backward, Matching, Control Knowledge, Nonmonotonic reasoning,

Logics for Nonmonotonic reasoning, Truth Maintenance Systems, Probability and Bayes' Theorem, Certainty Factors and Rule-Based Systems, Bayesian Networks, Fuzzy Logic.

SECTION-B

Unit 4: Planning (6 Hrs)

Planning: Introduction, An example domain: The blocks world, component of planning system, goal stack planning, non linear planning using constraint pasting, hierarchical planning, Reactive system.

Unit 5 : Advanced AI (6 Hrs)

Game playing: Min max search procedure, Alpha-Beta cutoffs, Natural Language Processing**:** introduction, Symantic Processing, Semantic Analysis, Discourse and Pragmatic Processing.

Unit 6: Learning & Expert systems (8 Hrs)

Introduction to learning, Rote learning, learning by taking advice, learning in problem solving, learning from examples: Induction, explanation based learning , Representing and using Domain knowledge, Architecture of expert systems, knowledge acquisition.

Text Books:

1. Elaine rich and Kevin Knight, Shivshankar Nair, "Artificial Intelligence", 3rd Edition, Tata McGraw-Hill, ISBN-10-0070087709, ISBN-13-9780070087705
2. Stuart Russell, Peter Norvig, "Artificial Intelligence-A Modern Approach", 2nd Edition, Pearson Education / Prentice Hall of India, ISBN:01379023952

Reference Books:

1. Eugene Charniak, Drew McDermott, "Introduction to Artificial Intelligence", Pearson Education, ISBN 81-7808-033-8
2. Ivan Bratco, "PROLONG: Programming for Artificial Intelligence", Pearson Education, 3rd edition, ISBN 10:0-201-40375-7
3. Saroj Kaushik, "Artificial Intelligence", Cengage learning, ISBN-13:9788131510995
4. Dan W. Patterson, "Introduction to Artificial Intelligence and Expert Systems", Prentice Hall of India, ISBN: 81-203-0777-1
5. Rjschat-Koft "Artificial Intelligence & Engineering Approach ", Tata Mc-Graw Hill

PATTERN OF QUESTION PAPER:

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For 80 marks Paper:

1. Minimum ten questions

2. Five questions in each section
3. Question no. 1 from section A and Question no. 6 from section B, 10 marks each, will be compulsory.
4. From the remaining questions in section A and B students are supposed to solve any two questions, 15 marks each.

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Third Year Engineering (CSE/IT)
Semester – II

Course Code: CSE393 **Title: Network Security (Elective-II)**

Teaching Scheme
Theory: 4 Hours/Week

Examination Scheme
Class Test: 20 Marks
Theory Examination (Marks): 80 Marks
Theory Examination (Duration): 03 Hours

Prerequisite:
1. Introductory course on computer Networks

Objectives:
To study principal and latest practices for building reliable and secure code to defend against various attack techniques, harmful viruses and threats.

CONTENTS

SECTION-A

Unit 1: Introduction (06 Hours)
Need for Security, Security trends, Security Attacks, Security Services and Mechanisms.
Classical encryption Techniques: Symmetric cipher model, Substitution techniques, transportation techniques, Steganography.
Block ciphers and data encryption standard: Block cipher principles, the data encryption standard, block cipher design principles.

Unit 2: Symmetric ciphers (06 Hours)
Multiple encryption and triple DES, Block cipher modes of operation, Stream ciphers and RC4, Stream ciphers – Blowfish, Modern Symmetric encryption - IDEA, Confidentiality using Symmetric Encryption, Placement of encryption function, traffic confidentiality, Random number generation.

Unit 3: Introduction to number theory (08 Hours)
Prime numbers, Fermat's and Euler's theorems, Chinese Remainder Theorem, Discrete logarithms
Public key cryptography - Principles of public keycrypto systems and RSA, Key management, Diffie-Hellman key exchange, Elliptic curve arithmetic, Elliptic curve cryptography, Key

Distribution, Message authentication and Hash functions, Security and Hash functions and MACs,
HMAC, CMAC, Digital signatures and authentication protocols.

SECTION-B

Unit 4: Attacks (06 Hours)
DoS/DDoS attacks, Back door, Spoofing, Man-in-the-middle, Replay, TCP/Hijacking, Fragmentation attacks, Weak keys, Mathematical attacks, Port scanning, Dumpster diving, Birthday attacks, Software exploitation, Inappropriate system use, Eavesdropping, War driving, TCP sequence number attacks, War dialing/demon dialing attacks.

Unit 5: Other public Key Cryptosystems (06 Hours)
Public key algorithms using GMP, Introduction to packet sniffing tool, Architecture of SSL, Attacks on SSL, Introduction to Intruder detection System, Snort and stenographic tools. Protecting against programmed threats, viruses and worms. Security for modems

Unit 6: Wireless and IP Security (08 Hours)

IEEE 802.11 Wireless Security, WEP, WEP security upgrades,
IEEE 802.11i, Wireless application protocol, IP Security architecture, Authentication header, Encapsulating security pay load, combining security associations. Brief on Cloud Security and Forensics- Media, Cyber, S/W and Mobile forensics (With Case study).

Text Books:
1. William Stallings, Cryptography and Network Security, Pearson Education
2. Eric Cole, Dr. Ronald Kurtz and James W. Conley, Network Security Bible, Wiley Publishers
3. Jason Albanese and Wes Sonnenreich, Network Security Illustrated, MGH Publishers

Reference Books:
1. Bruce Schneier, "Applied Cryptography", John Wiley & Sons
2. Bragg, Keith Strassberg, and Mark Rhodes- “Network Security: The Complete Reference”, Ousley
3. Atul Kahate. “Cryptography and Network Security.” Tata McGraw-Hill Education,
NPTEL : Prof. D. Mukhopadhyay, Cryptography and Network Security

PATTERN OF QUESTION PAPER:
Six units in the syllabus shall be divided in two equal parts i.e. 3 units in each part. Question paper shall be set having two sections A and B. Section A questions shall be set on first part and Section B questions on second part. Question paper should cover the entire syllabus.

For 80 marks Paper:

1. Minimum ten questions
2. Five questions in each section
3. Question no. 1 from section A and Question no. 6 from section B, 10 marks each, will be compulsory.
4. From the remaining questions in section A and B students are supposed to solve any two questions, 15 marks each.

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Third Year Engineering (CSE/IT)
Semester – II

Course Code: CSE371 **Title: LAB-I Advanced Java**

Teaching Scheme
Practical: 02 Hours/Week

Examination Scheme
Practical /Oral Examination: 50 Marks
Practical /Oral Examination (Duration): 03 Hours

Suggestive List of Practical Assignments:

Assignment No.: 1 Develop simple application using AJAX and JSON.
Assignment No.: 2 Develop application using for Servlet life cycle
Assignment No.: 3 Develop a Servlet program to print HTTP header information.
Assignment No.: 4 Develop application using JSP
Assignment No.: 5 Develop application using JSP Elements: Directives, Scripting, Action tags
Assignment No.: 6 Develop applicatiion using JSP Directives, Scripting, Action tags,
Assignment No.: 7 Develop application using JSP object scope page, request, session
Assignment No.: 8 Develop application program using custom tags
Assignment No.: 9 Develop application stateless JavaBeans
Assignment No.: 10 Develop application statelful JavaBeans
Assignment No.: 11 Develop application entity JavaBeans
Assignment No.: 12 Develop a hibernate application to store the feedback of website visitors in database
Assignment No.: 13 Develop Simple MVC Spring application.
Assignment No.: 14 Develop simple Hibernate application using any Database.
Assignment No.: 15 Develop SOAP web service based application.
Assignment No.: 16 Develop RESTful web service for based application.

Practical Examination:

Practical Examination should be conducted by internal examiner for three hours under the supervision of external examiner. External examiner should evaluate student by checking practical performance and conducting viva.

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Semester – II

Course Code: CSE372 **Title: LAB VI Software Testing & Quality Analysis**

Teaching Scheme **Examination Scheme**

Practical: 2 Hours/Week Term Work: 50 Marks

Suggestive List of Practical Assignments:

Design, develop and implement the following Assignments.

Study of Manual and Automated Testing.

1. Write a program in C for Matrix multiplication and check its failure also introspect the causes for its failure and write down the possible reasons for its failure.
2. Take any system (e.g. ATM system) and study its system specifications and report the various bugs.
3. Write the test cases for any known application (e.g. Banking application)
4. Create a test plan document for any application (e.g. Library Management system)
5. Test any one web application using Selenium testing tool.
6. Study of any bug tracking tool (e.g. Bugbit)
7. Test any Java application using JMeter.
8. Creating a test report using BugZilla.
9. Design and Develope test cases for Mobile application.0

Term Work:

The Term Work shall consist of at least 8 experiments / assignments based on the suggestive list of practical assignments. Assessment of term work should be done as follows:

- Continuous lab assessment
- Actual practical performance in laboratory
- Oral examination conducted (internally) at the time of submission

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Semester – II

Course Code: CSE373 **Title: LAB 7: Design and Analysis of Algorithms**

Teaching Scheme
Practical: 2Hrs/week

Examination Scheme
Practical & Oral: 50 Marks
Practical Exam Duration: 3 Hours

Suggestive List of Practical Assignments:

Design, develop and implement the following programs using C or C++ language in LINUX/Windows environment.

1. Program to implement Heapsort.
2. Program to implement Insertion sort, Bubble sort and Selection sort
3. Program to implement Binary search using Divide and Conquer.
4. Program for finding the minimum and maximum using Divide and Conquer.
5. Program to implement merge sort using Divide and Conquer.
6. Program to implement Knapsack problem using Greedy method.
7. Program to implement Prims Algorithm using greedy method.
8. Program to implement Kruskal's Algorithm using Greedy method.
9. Program to implement Multistage Graphs using Dynamic Programming.
10. Program to implement All pairs Shortest Path using Dynamic Programming.
11. Program to implement Graph traversal: - Breadth First Traversal.
12. Program to implement Graph traversal: - Depth First Traversal.
13. Program to implement 8- Queens' problem using Backtracking.

Practical Examination:

Practical Examination should be conducted by internal examiner for three hours under the supervision of external examiner. External examiner should evaluate student by checking practical performance and conducting viva.

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Semester – II

Course Code: CSE374 **Title: LAB-8: Distributed Operating System (Elective –II)**

Teaching Scheme: **Examination Scheme:**

Practical: 02 Hours/Week Term Work: 50 Marks

Suggestive List of Practical Assignments:

Design, develop and implement the following Assignments (Minimum 8).

Assignment No.:1 Client/server using RPC/RMI.
Assignment No.:2 Implementation of multi tread application
Assignment No.:3 Inter-process communications
Assignment No.:4 Group Communications
Assignment No.:5 Load Balancing Algorithms
Assignment No.:6 Name Resolution protocol
Assignment No.:7 Election Algorithms
Assignment No.:8 Clock Synchronization algorithms
Assignment No.:9 Mutual Exclusion Algorithms
Assignment No.:10 Deadlock management in Distributed system
Assignment No.:11 Distributed File Systems
Assignment No.:12 CORBA File

Term Work:

The Term Work shall consist of at least 8 experiments / assignments based on the suggestive list of practical assignments. Assessment of term work should be done as follows:

- Continuous lab assessment
- Actual practical performance in laboratory
- Oral examination conducted (internally) at the time of submission

Dr. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY, AURANGABAD
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Semester – II

Course Code: CSE375 **Title: LAB-8 Artificial Intelligence (ELECTIVE-II)**

Teaching Scheme **Examination Scheme**

Practical: 02 Hours/Week Term Work: 50 Marks

Suggestive List of Practical Assignments:

Design, develop and implement the following Assignments …....

1. Study of Prolog
2. Program to generate family tree
3. Program for Water Jug Problem.
4. Program checking a person eligible for voting.
5. Write a program to implement Single Player Game (Using Heuristic Function)
6. Write a program to Implement A* Algorithm.
7. Program to calculate factorial of a number
8. Program for generating Fibonacci series
9. Program for generating pyramid
10. Program for Towers of Hanoi puzzle
11. Design an expert system (Ex. Medical Diagnosis System)

Term Work:

The term work shall consist of at least 8 experiments/ assignments based on the syllabus above.
Assessment of term work should be done as follows

Continuous lab assessment

Actual practical performance in Laboratory.

Dr. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY, AURANGABAD
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Semester – II

Course Code: CSE376 **Title: LAB-8: Network security (Elective-II)**

Teaching Scheme **Examination Scheme**

Practical: 2 Hours/Week Term Work: 50 Marks

Suggestive List of Practical Assignments:

1. Write a socket program to implement TCP quiz
2. Write a program for a tic-tac-toe game with any attack model
3. Write socket programs for authentication problems
4. Implement a File Transfer Protocol and analyze attack pattern.
5. Write a problem of secure communication between two groups
6. Design a communication protocol to anonymous routing.
7. Design and code security association between computers in a network through shared access
8. Exercises on Snort, Wireshark, network simulator tools.

NOTE: At least 08 Experiments along with a mini application must be done in the semester.

Term Work:

The Term Work shall consist of at least 8 experiments / assignments based on the suggestive list of practical assignments. Assessment of term work should be done as follows:

- Continuous lab assessment
- Actual practical performance in laboratory
- Oral examination conducted (internally) at the time of submission

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FACULTY OF SCIENCE AND TECHNOLOGY
Third Year Engineering (CSE/IT)
Semester – II

Course Code: CSE377 | **Title: Lab IX Software Development Lab-II (Mobile Application Development for Android)**

Teaching Scheme
Practical: 2 Hours/Week

Examination Scheme
Practical Exam(Marks): 50
Practical/Oral Exam (Duration): 3 hrs.

Prerequisite

1. Concepts in Object Oriented Programming Language
2. Knowledge of XML

Objectives:

1. To know the difference between android and other mobile development platform.
2. To understand how android app work through life cycle, intents, manifests etc.
3. To develop different android app with compelling user interfaces using menus, layouts and Views.
4. To use android API for data storage, retrieval, content providers, SMS and Telephony.
5. Tap into location based services and different sensors.

CONTENTS

SECTION-A

Unit 1: Introduction to Android

A little Background about mobile technologies, Android – An Open Platform for Mobile development, Native Android Application, Android SDK Features, what does Android run on? Free Additional Benefits Only At WEBCOM, Why Develop for Mobile?, Why develop for Android? , Android Development Framework, Android Application Architecture, Android Libraries

Unit 2: User Interface

Developing for Android, First Android application Using Android Studio/Visual studio xamarin,

Running and Debugging, Creating Application and Activities, Application Manifest Introduction,

Android Application Life Cycle, Application Priority and process states, Fundamental Android UI

Design, Study of different layouts (Linear, relative, table, absolute, frame, Constraint), Introducing
Views, Creating new Views, Draw able Resources, Creating and Using menus

Unit 3: Intents, Broadcast Receivers and Files

Introducing Intents, Intents and Intent filters, What are Pending Intents, Adapters, Internet Resources, Notifications, Introducing Dialogs, Saving Application Data in external and internal memory, Creating and saving preferences, Retrieving shared preferences, Creating a standard preference activity, Saving Activity State, Saving and Loading Files, Including static files as Resources, File management tools

Unit 4: Database and Content Providers

Introducing Android Databases, Introducing SQLite, Cursors and content values, Working with SQLite Database, Creating new content Provider, Introduction to Firebase, Real time/ Cloud, Authentication in firebase, Introduction to MySQL database, Connecting to MySQL by JSON, PHP scripts.

Unit 5: Telephony, Hardware and Network Services

Telephony, Reading Phone device details, Reading Sims Details, Incoming and outgoing call monitoring, Tracking Service Change, Introducing SMS and MMS, Sending SMS and MMS, Sending SMS messages manually, Use of Bluetooth, Managing Network Connectivity, Managing Wi-Fi

Unit 6: Google Services/Maps, Sensors and Multimedia

Google Map - Layout file, Google Map – Android Manifest file, Customizing Google Map, Adding Marker, Changing Map Type, Enable/Disable zoom, Using Sensors and Sensor Manager Interpreting sensor values, Using Compass, Accelerometer and orientation services, Controlling Device Vibration, Working with multimedia players (Audio/Video)

Text Books/ Reference Books/ Internet Resource:

5. Hello Android: Pragmatic Book Shelf 2009
6. Professional Android Development, Wrox
7. Mobile App Development
8. https://www.tutorialspoint.com,

List of Suggestive Experiments

Design, develop and implement following assignments using Android Studio/ Visual studio xamarin.

1. Design and develop Android Application to display “Hello World” using basic Widgets
2. Design and develop Android Application to demonstrate Activity Life Cycle

3. Design and develop Android Application to demonstrate GUI by using different Layouts/widgets
4. Design and develop Android Application to demonstrate views in Android
5. Design and develop Android Application to demonstrate Intents(Implicit/ Explicit)
6. Design and develop Android Application to demonstrate Broadcast Receivers/Services
7. Design and develop Android Application to demonstrate Saving Files in External/Internal Storage
8. Design and develop Android Application to demonstrate Content Providers
9. Design and develop Android Application to demonstrate SQLite database (Dictionary, Quiz, etc.)
10. Design and develop Android Application to demonstrate firebase operations (data push, retrieval, delete, update etc.)
11. Design and develop Android Application to demonstrate MySQL database
12. Design and develop Android Application to demonstrate use of Telephony (Call/SMS)
13. Design and develop Android Application to demonstrate use of Bluetooth/wi-fi
14. Design and develop Android Application to demonstrate use of google map API
15. Design and develop Android Application to play audio/video files
16. Design and develop Android Application to demonstrate sensors (Accelerometer/Campass)

List of Suggestive Assignments

1. Develop an application for Hospital(Patient/Doctor portal)
2. Develop an application for online Quiz
3. Develop chat application

MINI PROJECT (Compulsory): Students has to submit a mini project at end of semester with report in a group of maximum 3 students

Practical Examination:

Practical Examination should be conducted by internal examiner for three hours under the supervision of external examiner. External examiner should evaluate student by checking practical performance and conducting viva.
