Swami Ramanand Teerth Marathwada University,Nanded

Teaching and Evaluation Scheme for
Third Year Program in Information Technology

Semester V

Effective from 2016-2017

Course Code	Course Name	Teaching Scheme			Credits		
		L	T	P	T	P	Total
IT301	Operating Systems	04	-	02	03	01	04
IT302	Automata Theory	03	01	-	03	-	03
IT303	Database Management Systems	04	-	02	03	01	04
IT304	Data Communication & Networks	03	01	02	03	01	04
IT305*	Elective-I	03	01	02	03	01	04
IT308	Web Technology Lab-I	02	-	02	-	02	02
Total		19	03	10	15	06	21

IT 305*	**Elective-I**
IT 305	Java programming
IT 306	Digital Signal Processing
IT 307	Information Theory and Coding

Total Credits: 21
Total Contact Hours/Week: 32

Evaluation Scheme					
Theory Credit Course		Theory Audit Course		Practical / Workshop	
MSE	ESE	MSE	ESE	Continuous Evaluation	ESE
20 M	80 M	20 M	80 M	30 M	70 M
Minimum for Passing in Theory, Audit and Practical / Workshop : 40 Each					

Swami Ramanand Teerth Marathwada University,Nanded

Teaching and Evaluation Scheme for
Third Year Program in Information Technology
Semester VI
Effective from 2016-2017

Course Code	Course Name	Teaching Scheme			Credits		
		L	T	P	T	P	Total
IT 309	Software Engineering	03	01	-	03	-	03
IT 310	Compiler Design	03	01	02	03	01	04
IT 311	Computer Networks	04	-	02	03	01	04
IT 312	Unix Operating System	03	01	02	03	01	04
IT 313*	Elective -II	03	01	02	03	01	04
IT 316	Professional Aptitude and Logical Reasoning	02 AUDIT	-	-	-	-	-
IT 317	Web Technology Lab-II	02	-	02	-	02	02
IT 318	Seminar	-	-	-	-	01	01
Total		20	04	10	15	07	22

IT313*	Elective II
IT 313	Python Programming
IT 314	Advanced Database Management Systems
IT 315	Computer Organization & Architecture

Total Credits: 22
Total Contact Hours/Week: 34

Evaluation Scheme					
Theory Credit Course		Theory Audit Course		Practical / Workshop	
MSE	ESE	MSE	ESE	Continuous Evaluation	ESE
20 M	80 M	20 M	80 M	30 M	70 M
Minimum for Passing in Theory, Audit and Practical / Workshop : 40 Each					

Swami Ramanand Teerth Marathwada University, Nanded

Third Year U.G. Program in Information Technology

Effective from 2016-17

IT301: OPERATING SYSTEMS

Teaching Scheme L: 4 T: 0

Evaluation Scheme	MSE	ESE	Minimum Passing Marks
	20 Marks	80 Marks	40%

Course Objectives:

1. To understand the basics of computer architecture and operating system.
2. To study resource management activities operating system.
3. To acquire knowledge about OS design issues.
4. To learn and understand operating system policies and mechanisms.

Course Contents:

Unit-I: Introduction to Computer Architecture (7Hrs)

Top Level view of Computer system components, Machine instructions, ALU, data - path and control unit. Instruction pipelining, Memory hierarchy: cache, main memory and secondary storage; I/O interface, interrupt and DMA mode.

Unit-II: Introduction to OS (7 Hrs)

Operating System, Evolution of OS, Batch, Time sharing, Multiprogramming, Multitasking, Real time, Distributed, Clustered OS services, System calls, System structure, Virtual machine.

Unit-III: Process Management and Scheduling (6 Hrs)

Process concept, Process states, Operations on processes, Inter process communication, Threads, Multithreading models, Concept of scheduling, Scheduling criteria and algorithms, Multiple-processor scheduling.

Unit-IV: Process synchronization and Deadlock (6 Hrs)

Concept, The critical-section problem, Synchronization hardware, Semaphore, Critical region, Monitor, Deadlock Detection, prevention and handling.

Unit-V: Memory management and Virtual memory (7 Hrs)

Concept, Contiguous and non-contiguous memory allocation, Swapping, Paging, Segmentation Virtual memory, Demand paging, Page replacement, Thrashing.

Unit-VI: File Management and Security (7 Hrs)

Concept, Access methods, Directory structure, File sharing, File system structure, Free space management, goals of protection, Domain of protection, Access matrix, the security problem, User authentication, Program threats, Security threats.

Outcomes:

After completion of this course the student will be able to:

1. Describe the general architecture of computers.
2. Describe process management, scheduling and synchronizations.
3. Understand and analyze theory and implementation of processes, memory management, physical and virtual memory, scheduling, file management and security.

Text Books:

1. "*Operating System Concepts*" by Abraham Silberschatz, Peter Baer Galvin, Greg Gagne (6^{th} Edition, John Wiley and Sons) ISBN-10: 0471417432 and ISBN-13: 978-0471417439
2. "*Computer Organization and Design*" by David Patterson, John Hennessy (6^{th} Edition 2003, Pearson Education) ISBN: 0-13-048440-7.

Reference Books:

1. "*Operating System – Internals and design principles*" by William Stallings (Prentice-Hall India).

Swami Ramanand Teerth Marathwada University, Nanded

Third Year U.G. Program in Information Technology

Effective from 2016-17

IT301: OPERATING SYSTEMS LAB

Teaching Scheme **L:0 P: 2**

Evaluation Scheme	Continuous Evaluation	ESE	Minimum Passing Marks
	30 Marks	70 Marks	40%

Term Work:

1. Instructor will frame programming assignments based on the suggested list of assignments using C/C++ language.
2. Instructor is expected to incorporate variations in list.
3. Students will submit term work in the form of a journal that will include at least 10 practical assignments.

The assessment will be based on the following –

1. Performance in the practical examination.
2. Record of programs submitted by the candidate.
3. Innovation & Creativity.
4. Team building skills.
5. Technical writing skills.

Suggested list of assignment

1. Study of laboratory environment: Hardware specifications, software specifications.
2. Programs using system calls, library function calls to display and write strings on standard output device and files.
3. Write a program for error reporting using errno, perror( ) function.
4. Write a program for process creation and inter process communication.
5. Write a program to simulate process scheduling algorithms like FCFS, Shortest Job First and Round Robin.
6. Write a program to simulate page replacement algorithms like FIFO, Optimaland LRU.
7. Write a program to implement deadlock detection algorithm.
8. Write a program to implement Bankers' algorithm.
9. Write a program to implement of reader-writer problem.

10. Write a program to implement thread synchronization using semaphores.
11. Write a program to implement producer-consumer problem.
12. Write a program to implement of static partitioning and dynamic partitioning of memory.
13. Write a program to implement simple encryption and decryption technique.
14. Study and comparison of different operating systems.

Practical Examination:

Practical examination will be of 3 hours and it includes performance and viva-voce examination based on the term work.

Swami Ramanand Teerth Marathwada University, Nanded

Third Year U.G. Program in Information Technology

Effective from 2016-17

IT302: AUTOMATA THEORY

Teaching Scheme **L: 3 T: 1**

Evaluation Scheme	**MSE**	**ESE**	**Minimum Passing Marks**
	20 Marks	**80 Marks**	**40%**

Course Objectives:

1. To understand the concepts of Finite Automata.
2. Students should be able to design Turing machine.
3. Students should be able to design and analyze finite state machine.

Course Contents:

Unit I: Introduction to Set Theory (06 Hrs)

Set - Definition, Finite and infinite set, Countability of a set, Cardinality of a set, set operations, and Closure of a set.

Basic concepts - Symbols, Alphabet, String, Language, Difference between natural and formal language. Recursive definition of regular expression, Algebraic laws for regular expressions, Equivalence of regular expressions with finite automata, Regular set, Closure Properties of regular language, Pumping lemma for regular languages. Regular Expressions in UNIX, Applications of regular expressions - Lexical analysis, finding pattern in text.

Unit II: Finite Automata (FA): (08 Hrs)

Deterministic and Non-deterministic FA, Equivalence of NFAs and DFAs, NFA with ε- moves, Minimization of DFA, Equivalence of regular expression and FA, Arden's Theorem and its application, FA with output - Definition, Models, Interconversion, Application of FA – Text search, Recognizing a Set of Keywords.

Unit III: Grammars & Production systems (08 Hrs)

Definition of CFG, Designing context-free grammars, Derivation trees, Ambiguous grammar, inherently ambiguous grammar, removing ambiguity, Chomsky hierarchy, Regular grammar - definition, Left linear & right linear Regular Grammar, Inter-conversion between left linear and

right linear regular grammar. Regular grammar and Finite Automata,, Simplification of CFG, Application of CFG – YACC parser, XML and Document-Type Definitions.

Unit IV: Properties of Context Free Languages (06 Hrs)

Context Free Language (CFL) - definition, Normal forms - Chomsky Normal Form (CNF), Griebach Normal Form (GNF), closure properties of CFL, Pumping lemma for CFL, CYK algorithm for testing membership in a CFL.

Unit V: Pushdown Automata (06 Hrs)

Definition - PDA, Non-deterministic PDA, Acceptance by final state and empty store, construction of PDA, Equivalence between pushdown automata and context-free grammars, Multi-stack PDA, Introduction to Grammar systems and distributed Automata – CD (Cooperative distributed) grammar system, PC (Parallel Computing) Grammars.

Unit VI: Turing Machines (06 Hrs)

TM construction, Composite and Iterative TM, Universal TM, TM as enumerator, Variations of TM – Two-way Infinite Tape TM, Multi-tape TM, Linear Bounded Automata, Recursive sets, Recursively Enumerable Sets, Church's Turing Hypothesis, Halting problem. Undeciadability-Codes for Turing Machines, Notion of Undecidable problems, Rice's theorem, Post's correspondence problem (PCP).

Outcomes: At the end of this course, student will be able to:

1. Understand the concepts of automata, formal grammars and languages.
2. Identify the capabilities and limitations of computing machine.
3. Model various kinds of real-time problems.

Text Books

1. "*Introduction to Automata Theory, Languages and Computations*," by John E. Hopcroft, Rajeev Motwani and J.D.Ullman, (2nd Edition, Addison Wesley) ISBN-13:978-0201441246, ISBN-10**:** 0201441241.
2. "*Introduction to the Theory of Computation*"; M.Sipser, 2nd Edition, Cengage Learning ISBN-13:978-81-315-1750-5.
3. "*Introduction to Computer Theory*" by Daniel I. A. Cohen (2nd Edition, John Wiley & Sons).

Reference Books

1. "*Introduction to the Languages and the Theory of Computation*", by John.C.Martin (Third Edition, Tata McGraw-Hill, 2003) ISBN-13: 978-0073191461.

2. "*Introduction to Formal Languages, Automata Theory and Computation*", by Kamala Krithivasan, Rama R. (Pearson Education India) ISBN 978-81-317-2356-2.
3. "*Introductory Theory of Computer Science*", E.V.Krishnamurthy (East-West Press Publication Ltd.) ISBN:-81-85095-13-2
4. "*An Introduction to Formal Language and Automat*a", by Peter Linz (4th Edition, Narosa Publishing house, 2006) ISBN 13: 9789380853284.
5. "*Theory of Computer Science*", K.L.P.Mishra, N.Chandrasekaran(2nd Edition, Prentice-Hall of India Pvt.Ltd.) ISBN-81-203-1271-6

Swami Ramanand Teerth Marathwada University, Nanded

Third Year U.G. Program in Information Technology

Effective from 2016-17

IT303: DATABASE MANAGEMENT SYSTEMS

Teaching Scheme **L: 4 T: 0**

Evaluation Scheme	MSE	ESE	Minimum Passing Marks
	20 Marks	80 Marks	40%

Course Objectives:

1. To understand the different issues involved in the design and implementation of a database system.
2. To study the physical and logical database designs, database modeling, and relational models.
3. To understand and use SQL to query, update, and manage a database.
4. To develop an understanding of essential DBMS concepts such as: transaction processing, integrity, concurrency, and recovery in databases.
5. To design and build a simple database system and demonstrate competence with the fundamental tasks involved with modeling, designing, and implementing a DBMS.

Course Contents:

Unit I: Introduction (7 Hrs)

History of Database Systems, Database-System Applications, Purpose of Database Systems, View of Data, Database Languages, Relational Databases, Database Design, Data Storage and Querying, Transaction Management, Database Architecture, Specialty Databases, Database Users and Administrators. **E-R Model:** Overview of the Design Process, The Entity-Relationship Model, Constraints, Removing Redundant Attributes in Entity Sets, Entity-Relationship Diagrams, Reduction to Relational Schemas, Entity-Relationship Design Issues, Extended E-R Features, Alternative Notations for Modeling Data, and Other Aspects of Database Design. **Relational Model:** Structure of Relational Databases, Database Schema, Keys, Schema Diagrams, Relational Query Languages, Relational Operations, The Relational Algebra, The Tuple Relational Calculus.

Unit II: SQL (7 Hrs)

Introduction to SQL:Overview of the SQL Query Language, SQL Data Definition, Basic Structure of SQL Queries, Additional Basic Operations, Set Operations, Null Values, Aggregate Functions, Nested Subqueries, Modification of the Database. **Intermediate SQL:** Join Expressions, Views, Transactions, Integrity Constraints, SQL Data Types and Schemas, Authorization. **Advanced SQL**: Accessing SQL from a programming language, Functions and Procedures, Triggers.

Unit III: Relational Database Design (6 Hrs)

Features of Good Relational Designs, Atomic Domains and First Normal Form, Decomposition Using Functional Dependencies, Functional-Dependency Theory, Algorithms for Decomposition, Decomposition Using Multi-valued Dependencies, More Normal Forms, Database-Design Process, Modeling Temporal Data.

Unit IV: Storage and File Structure (8 Hrs)

Overview of Physical Storage Media, File Organization, Organization of Records in Files, Data-Dictionary Storage, Database Buffer.

Indexing and Hashing: Basic Concepts, Ordered Indices, B+-Tree Index Files, B-Tree Index Files, Index Definition in SQL, and a brief outline of Multiple-Key Access and Static Hashing, and the brief idea of Dynamic Hashing.

Unit V: Query Processing (6 Hrs)

Overview of Query Processing, Measures of Query Cost, Selection Operation, Join Operation. **Transactions:** Transaction Concept, A Simple Transaction Model, Storage Structure, Transaction Atomicity and Durability, Transaction Isolation, Serializability, Transaction Isolation and Atomicity, Transaction Isolation Levels, Implementation of Isolation Levels, Transactions as SQL Statements.

Unit VI: Concurrency Control (7 Hrs)

Lock-Based Protocols, Deadlock Handling, Multiple Granularity, Timestamp-Based Protocols, Validation-Based Protocols, Multi-version Schemes, Insert Operations, Delete Operations, and Predicate Reads.

Recovery System: Failure Classification, Storage, Recovery and Atomicity, Buffer Management, Failure with Loss of Nonvolatile Storage, Early Lock Release and Logical Undo Operations.

Course Outcomes:

1. Demonstrate an understanding of the relational data model.
2. Transform an information model into a relational database schema and to use a data definition language and/or utilities to implement the schema using a DBMS.
3. Formulate, using relational algebra, solutions to a broad range of query problems.
4. Formulate, using SQL, solutions to a broad range of query and data update problems.

Text Books:

1. *"Database System Concepts"* by Avi Silberschatz, Henry F. Korth, S. Sudarshan, Sixth Edition, McGraw-Hill. ISBN 9780071325226
2. *"Fundamentals of Database Systems"*, by Elmarsi, Navathe, Somayajulu, Gupta, Fifth Edition. Pearson Education. ISBN 9788131758984

Reference Books:

1. *"Database Management System",* by Raghu Ramakrishnan, Tata McGraw-Hill Publishing Company 2003.ISBN 978-0072465631.
2. "Database System Implementation" by Hector Garcia–Molina, Jeffrey D.Ullman and Jennifer Widom, Pearson Education- 2000. ISBN 978-0130402646
3. "Database System Concepts" by Peter Rob and Corlos Coronel, Cengage Learning Edition 2008. ISBN 9788131514405.

Swami Ramanand Teerth Marathwada University, Nanded

Third Year U.G. Program in Information Technology

Effective from 2016-17

IT303:DATABASE MANAGEMENT SYSTEMS LAB

Teaching Scheme P: 2

Evaluation Scheme	Continuous Evaluation	ESE	Minimum Passing Marks
	30 Marks	70 Marks	40%

Term Work:

1. Instructor will frame programming assignments based on the suggested list of assignments using Oracle / MySQL Server / Postgresq.
2. Instructor is expected to incorporate variations in list.
3. Students will submit term work in the form of a journal that will include at least 10 practical assignments or a Miniproject based on the suggested list of Experiments/Assignments.

The assessment will be based on the following –

1. Performance in the practical examination.
2. Record of programs submitted by the candidate.
3. Setting goals higher than expected from the problem statement.
4. Innovation & Creativity.
5. Team building skills.
6. Technical writing skills.

Suggested List of Experiments/Assignments

The DBMS Laboratory will consist of minimum Eight Practicals

1) Study of E-R diagram.
2) To install and configure postgresql.
3) To use different DDL and DML commands.
    a. Data Definition, Table Creation.
    b. Implementing Constraints on databases
4) Implement the queries in Oracle/postgresql
    a. Insertion
    b. Retrieval
    c. Update

d. Delete

   By using =, <, >, and, or, not.

   Also perform set operation and aggregate function.

5) Implement the queries in Oracle/postgresql for
   a. Pattern matching, date and group by clause.
   b. Extracting data from more than one table.
   c. Nested sub queries.
6) To create view and perform different operation on view.
7) To implement Procedure in Oracle/postgresql.
8) To implement triggers in Oracle/postgresql.
9) Study of embedded SQL.
10) Database connectivity.

Practical Examination:

Practical examination will be of 3 hours and it includes performance and viva-voce examination based on the term work.

Swami Ramanand Teerth Marathwada University, Nanded

Third Year U.G. Program in Information Technology

Effective from 2016-17

IT 304: DATA COMMUNICATION & NETWORKS

Teaching Scheme **L: 3 T: 1**

Evaluation Scheme	MSE	ESE	Minimum Passing Marks
	20 Marks	80 Marks	40%

Course Objectives:

1. To study about the concepts of Data communication and different transmission media.
2. To know about Error detection and Correction codes and understand about Network architecture & reference model.
3. To study and understand Physical & Data link layer (DLL) and multiple access & IEEE 802.3 (Ethernet/Wired LAN).
4. Allow the student to gain expertise in some specific areas of networking such as the design and maintenance of individual networks.

Course Contents:

Unit-I: Data communication Concepts & Terminology (6 Hrs)

Data communication, data communication model, communication components, data representation, data transmission, modes of data transmission, analog & digital signals & transmission, digital signal encoding, unipolar & polar line codes, data compression.

Unit-II: Transmission media signal modulation techniques (7 Hrs)

Wired & wireless transmission, transmission errors, types of error, transmission channels (noisy & noiseless channel): Nyquist & Shannon theorem, digital modulation methods-ASK, PSK & FSK. Sampling process, practical features of sampling & signal recovery PCM, DPCM, DM.

Unit-III: Error Detection & Correction codes (6 Hrs)

Error Detection methods: parity checking, checksum, Cyclic Redundancy Check (CRC), Error Correction: Linear block code, forward error correction method: block parity, hamming code, interleaved codes, and convolution code. Reverse error correction: stop & wait, Go-Back-N, selective retransmission.

Unit-IV: Network architecture & reference model (7 Hrs)

Overview of computer network, network criteria, network topology, categories of networks-LAN, WAN, MAN, network models: OSI & Internet (TCP/IP) models, protocols & standards, layers in the ISO/OSI reference model, TCP/IP protocol suite.

Unit-V: Physical & Data link layer (DLL) (7 Hrs)

Physical layer: connection, services provided to the data link layer, functions of physical layer, relaying functions in the physical layer, physical interface, physical layer standards, DLL: need of DLL, frame design consideration, flow & error control, DLL protocols (for noisy & noiseless channel).

Unit-VI: Multiple access & IEEE 802.3 (Ethernet/Wired LAN) (7 Hrs)

Multiple access techniques: ALOHA, CSMA, CSMA/CD, CSMA/CA, IEEE standards: IEEE 802.2, 802.3, 802.5, 802.11 (Wireless LAN), wireless LAN: communication modes, layered architecture of wireless LAN.

Outcomes:

After completion of this course the student must demonstrate the knowledge and ability to:

4. Independently understand basic computer networks technology and understand the concepts data communications system and its components.
5. Explain Transmission media signal modulation techniques and enumerate the layers of the OSI model and TCP/I.
6. Understand Error Detection & Correction codes and multiple access & IEEE 802.3.

Text Books:

1. "*Data Communications & Networking*" by Behrouz A.Forouzan (4th Edition, McGraw Hill Education Private Ltd.) ISBN-13: 978-1-25-906475-3.
2. "*Data Communications & Computer Networks*" by Prakash C. Gupta (5th Edition, PHI Learning Private Ltd.) ISBN- 978-81-203-2846-4.

Reference Books:

1. "*Data & Computer Communication*" by William Stalling (7th Edition, PHI Publication).
2. "*Digital Communication*" by Simon Haykin (WSE Edition).

Swami Ramanand Teerth Marathwada University, Nanded

Third Year U.G. Program in Information Technology

Effective from 2016-17

IT304: DATA COMMUNICATION & NETWORKS LAB

Teaching Scheme P: 2

Evaluation Scheme	Continuous Evaluation	ESE	Minimum Passing Marks
	30 Marks	70 Marks	40%

Term Work:

1. Instructor will frame programming assignments based on the suggested list of assignments using C/C++ language.
2. Instructor is expected to incorporate variations in list.
3. Students will submit term work in the form of a journal that will include at least 10 practicals assignments.

The assessment will be based on the following –

1. Performance in the practical examination.
2. Record of programs submitted by the candidate.
3. Innovation & Creativity.
4. Team building skills.
5. Technical writing skills.

Suggested list of experiments/programs:

1. Write a program to implement Nyquist theorem.
2. Write a program to implement Shannon's theorem.
3. Write a program on Error detection & Correction using: a) CRC b) Hamming Code c) Checksum.
4. Write a program to implement Simplest Protocol with no flow or error control.
5. Write a program to implement Stop & Wait protocol.
6. Write a program to implement Stop & Wait ARQ protocol.
7. Write a program to implement Go – back- N protocol.

8. Write a program to Selective Repeat protocol.
9. Write a program to implementation of the Data Link Layer framing methods such as character stuffing & bit stuffing.
10. Study of Hubs, Repeaters, Switches, Routers and Bridges.
11. Study of modem communication.
12. A detailed study of different types of cables used in computer networking.

Practical Examination:

Practical examination will be of 3 hours and it includes performance and viva-voce examination based on the term work.

Swami Ramanand Teerth Marathwada University, Nanded

Third Year U.G. Program in Information Technology

Effective from 2016-17

IT305: ELECTIVE-I: JAVA PROGRAMMING

Teaching Scheme **L: 3 T: 1**

Evaluation Scheme	MSE	ESE	Minimum Passing Marks
	20 Marks	80 Marks	40%

Course Objectives:

1. To understand object oriented features of java and implementing it in java programming.
2. To learn and understand inheritance, interfaces, multithreading and exception handling.
3. To understand different input/output objects (input vs. output, character vs. byte, data vs. processing, object) and methods and the structure of the java.io package.
4. To learn and understand the use of applets and file handling.

Course Contents:

Unit I Introduction (7 Hrs)

Need of Java, the byte-code, Java Buzzwords, Java program structure, lexical issues, Data types supported by Java, Variable declaration and scope, Type conversion, Array, Operators in Java, Control structure (if, if-else, nested if, if-else-if, switch), Loops (while, Do-while, for), nesting of loop (while, for), the use of break and continue inside loop.

Unit II Classes and Objects (7 Hrs)

Defining class and declaring objects using new keyword, methods inside of class, constructors, this keyword, garbage collection, finalize() method, method overloading, constructor overloading, passing object as a method arguments, method returning objects, use of static and final keyword.

Unit III Inheritance, Packages and Interface (6 Hrs)

Inheritance basics, use of super keyword, method overriding, abstract class, use of final keyword, defining Package, access protection in package, defining Interfaces, extending Interfaces.

Unit IV Exception Handling (7 Hrs)

Basics, types of exception, try catch block, multiple catch blocks, use of throw, use of finally, built-in exception provided by Java, creating own exception.

Unit V Multithreading (7 Hrs)

Basics of threads, the main thread, creating threads, use of isAlive() and join(), thread priorities, synchronization of threads, communication between threads, operations on threads.

Unit VI File handling and Applet (7Hrs)

File basics, the byte stream (input, output, file input, file output, bytearrayinput, bytearrayoutput), Buffer input stream, buffer output stream, pushback input stream, sequence input stream, character streams, Basics of applet, native methods.

Outcomes:

1. Student should know the model of object oriented programming and fundamental features of an object oriented language.
2. Student should know how to test, document and prepare a professional looking package for each business project.
3. Student have the ability to write a computer program to solve specified problems and to use the Java SDK environment to create, debug and run simple Java programs.
4. Student will be able to explain and develop programs for inheritance, multithreading, applets, exception handling and file handling.

Text Books:

1. "*Java 2: The Complete Reference"* by Herbert Schildt (5th Edition, Tata McGraw-Hill Education) ISBN-13:978-0-07-049543-2 and ISBN-10:0-07-049543-2.

Reference Books:

1. "Java*: The Complete Reference"* by Herbert Schildt (7th Edition, Tata McGraw-Hill Education) ISBN-13:978-0-07-063677-4 and ISBN-10:0-07-063677-X.
2. "*Programming with Java"* by E Balagurusamy (4th Edition, Tata McGraw-Hill Education Pvt.Ltd) ISBN-13:978-0-07-014169-8 and ISBN-10:0-07-014169-X.

Swami Ramanand Teerth Marathwada University, Nanded

Third Year U.G. Program in Information Technology

Effective from 2016-17

IT305: ELECTIVE-I:
JAVA PROGRAMMING LAB

Teaching Scheme **P: 2**

Evaluation Scheme	**Continuous Evaluation 30 Marks**	**ESE 70 Marks**	**Minimum Passing Marks 40%**

Term Work:

1. Instructor will frame programming assignments based on the suggested list of assignments using Java language.
2. Instructor is expected to incorporate variations in list.
3. Students will submit term work in the form of a journal that will include at least 10 practical assignments.

The assessment will be based on the following –

1. Performance in the practical examination.
2. Record of programs submitted by the candidate.
3. Innovation & Creativity.
4. Team building skills.
5. Technical writing skills.

Suggested list of Experiments/Programs.

1. a) Program to read data from keyboard using readline() method and display the information on the screen.
   b) Program for creating and casting of variables and displaying the output on the screen.
   c) Program to demonstrate print() and println() methods using for loop.
2. Program for the illustration of math functions supported by java language.
3. a) Program to read the student data from keyboard and print the marksheet of student using decision making and branching statements.
   b) Program to illustrate the use of decision making and looping statement.
4. a) Program to demonstrate the use of classes and objects.
   b) Program to demonstrate the use of single, multiple, Hierarchical, and multilevel inheritance.

5. a) Program for the illustration of method overloading and method overriding.
   b) Program to sort a list of numbers using array.
   c) Program for addition and multiplication of two dimensional arrays.
6. a) Program for string handling using string methods.
   b) Program for the use of arrays, strings and vectors to convert a string vector into an array of strings and displays the strings.
7. a) Program to implement interfaces and multiple inheritances.
   b) Program to create, access, use a package and adding a class to a package.
8. a) Program for creation of threads using the thread class with the use of isAlive() , join(),yield(),stop(), and sleep() methods.
   b) Program to implement exceptions handling.
9. Program to implement the use of an applet by getting input from the user.
10. Program to use file stream classes for coping characters from one file contents into another.
11. Program for reading and writing bytes from and to a file.
12. Program to demonstrate how data is read from the keyboard for writing to a file and how to read back from the file for display on the screen.
13. Program to create simple sequential student file interactively using windows frame that have two text fields that receives information from the user at the keyboard and then writes information to a file and reads the data stored in "student.dat" and display the information.

Practical Examination:

Practical examination will be of 3 hours and it includes performance and viva-voce examination based on the term work.

Swami Ramanand Teerth Marathwada University, Nanded

Third Year U.G. Program in Information Technology

Effective from 2016-17

IT306: ELECTIVE-I:
DIGITAL SIGNAL PROCESSING

Teaching Scheme **L: 3 T: 1**

Evaluation Scheme	**MSE**	**ESE**	**Minimum Passing Marks**
	20 Marks	**80 Marks**	**40%**

Course Objectives:

1. To study about the concepts of Digital signals and systems.
2. To understand Frequency Domain of LTI systems.
3. To understand Digital Filter Structures and Digital Filter Design.

Course Contents:

Unit-I: Review of Digital Signals & Systems (6 Hrs)

Motivation, Advantages of DSP over ASP, Signal processing applications, Correlations, Discrete Fourier transform(DFT), Inverse DFT, Relation between DTFT & DFT, Properties of DFT, Circular convolution, Linear convolution using DFT.

Unit-II: Frequency Domain Analysis of LTI Systems (7 Hrs)

Frequency-Domain characteristics of LTI systems, Frequency response of LTI systems, LTI systems as frequency selective filters, all pass systems, Inverse systems, Minimum-phase & Maximum-phase systems, System identification & deconvolution.

Unit-III: Digital Filter Structures (7 Hrs)

Block diagram representation, Equivalent structures, Basic FIR structures, Basic IIR structures, All pass structures, IIR tapped cascaded lattice structures, FIR cascaded lattice structures.

Unit-IV: Digital Filter Design (8Hrs)

IIR filter design- Bilinear transformation, Impulse invariant transformation, Low pass IIR digital filters, Spectral transformations, FIR filter design using windowing technique, Frequency sampling technique, and Computer aided design.

Unit-V: DSP Algorithm Implementation (6 Hrs)

Fast Fourier Transform algorithms, Decimation in time, Decimation in frequency, Different algorithms of FFT such as DIT & DIF where input & output is in order, Radix-n algorithms.

Unit-VI: Multi Rate Digital Signal Processing (6 Hrs)

Introduction, Decimation by a factor D, Interpolation by a factor I, Sampling rate conversion by a rational factor I /D, Applications such as speech, image, sampling rate alteration, sub-band coding.

Outcomes:

After completion of this course the student must be able to:

1. Describe the basic concepts of digital signals and systems.
2. Understand Frequency Domain Analysis of LTI Systems and Digital Filter Structures and digital filter design.
3. Formulate engineering problems in terms of DSP tasks and apply engineering problem solving strategies to DSP problems.
4. Design and test DSP algorithms and analyze digital and analog signals and systems.

Text Books:

1. "*Digital Signal Processing Principles, Algorithms & Applications*" by John G.Proakis (4th Edition, PHI Publication) ISBN-10: 0131873741 and ISBN-13: 978-013187372.
2. "*Introduction to Digital Signal Processing*" by A.V.Oppenheim (PHI Publication) ISBN 978-2-940222-20-9.

Reference Books:

1. "*Introduction to Digital Signal Processing*" by J.R.Johnson (PHI Publication).
2. "*Digital Signal Processing a Computer-Based Approach*" by S.K.Mitra (2nd Edition, Tata McGraw Hill Pvt. Ltd) ISBN 0-9660176-3-3.
3. "Digital Signal Processing a Practical Approach" by E.C.Ifeachor (Pearson Education Asia).

Swami Ramanand Teerth Marathwada University, Nanded

Third Year U.G. Program in Information Technology

Effective from 2016-17

IT306: ELECTIVE-I:
DIGITAL SIGNAL PROCESSING LAB

Teaching Scheme **P: 2**

Evaluation Scheme	**Continuous Evaluation**	**ESE**	**Minimum Passing Marks**
	30 Marks	**70 Marks**	**40%**

Term Work:

1. Instructor will frame programming assignments based on the suggested list of assignments using C /C++ / Matlab language.
2. Instructor is expected to incorporate variations in list.
3. Students will submit term work in the form of a journal that will include at least 8 practical assignments.

The assessment will be based on the following –

1. Performance in the practical examination.
2. Record of programs submitted by the candidate.
3. Innovation & Creativity.
4. Team building skills.
5. Technical writing skills.

Suggested list of Experiments/Programs.

1. Generation of discrete time signals.
2. Computation of Linear convolution.
3. Computation of Discrete time Fourier transforms.
4. Computation of DFT and IDFT.
5. DFT Computation using FFT algorithms.
6. Computation of Circular convolution.
7. Design of FIR filters using windowing.
8. Design of IIR Butterworth filter.
9. Design of IIR Chebyshev filter.
10. Realization of filter.

Practical Examination:

Practical examination will be of 3 hours and it includes performance and viva-voce examination based on the term work.

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Effective from 2016-17

IT307: ELECTIVE-I:
INFORMATION THEORY AND CODING

Teaching Scheme **L: 3 T: 1**

Evaluation Scheme	MSE	ESE	Minimum Passing Marks
	20 Marks	80 Marks	40%

Course Objectives:

1. To understand basic concepts of coding theory.
2. To learn about basic source coding and channel coding techniques.
3. To understand the concepts of entropy and information communication.

Course Contents:

Unit-I: Introduction to Information Theory (6 Hrs)

Information theory, Sources & signals, elements of digital communication system, comparison of digital & analog communications, basic signal processing operations in digital communications, uncertainty, information & entropy, source coding theorem, Huffman coding, discrete memory less channels, mutual information, channel capacity, channel coding theorem, differential entropy & mutual information, differential entropy & mutual information for continuous ensembles.

Unit-II: Sampling & Source Coding (7 Hrs)

Sampling, sampling theorem, Quadrature Sampling of Band-pass signals, reconstruction of a message process from its samples, Signal distortion in sampling, Practical aspects of sampling & signal Recovery, Principle of source coding, properties of code used for source coding, Kraft Inequality, Instantaneous code construction procedure, code efficiency & redundancy, Noiseless coding Theorem (Shannon's First theorem), source coding techniques.

Unit-III: Error correcting codes & Modulation (6 Hrs)

Multiple & burst error correcting codes, Hamming distance, hamming codes, pulse amplitude modulation, Pulse code modulation, Differential Pulse code modulation, Delta Modulation,

robust quantization, time division multiplexing, Delta modulation, DPCM, coding speech at low bit rates.

Unit-IV: Communication Channel & Channel Encoding (7 Hrs)

The Discrete communication channel, bandwidth considerations, distortion, noise, mathematical models of information, logarithmic measure of information, information measures for continuous random variables, channel capacity and coding, entropy coding, linear block codes, convolution coding, cyclic coding, maximum likelihood decoding of convolution codes, decoding of block codes, partly check bit coding for error detection.

Unit-V: Secure communication (7 Hrs)

Spread spectrum, frequency hopping, number theory, modular arithmetic, hash functions, key management, originated authentication, data scrambling, block versus stream ciphers, public & private key system, cryptography, the data encryption standard.

Unit-VI: Image processing & Data Compression (7 Hrs)

Digital image fundamentals, digital image representation, elements of digital image processing, image compression models, redundancies, error free compression, variable length coding, bit plane coding, loss-less predictive coding, lossy compressions predictive coding, transform coding, vector quantization, video compression, Audio & Video compression, image compression standards: JPEG,MPEG,TIFF.

Outcomes:

After completion of this course the student will be able to:

1. Understand various source coding techniques.
2. Implement entropy and Mark-off statistical model.
3. Various error detecting codes.

Text Books:

1. "*Information Theory & Coding*" by S Veluswamy (New Age International Limited, Publishers) ISBN: 978-81-224-1811-8.
2. "*Digital Communication*" by Simon Haykin (WSE Edition) ISBN-10: 8126542314 and ISBN-13: 978-8126542314.

Reference Books:

1. "*Fundamentals of Digital Image Processing*" by A. K. Jain, (3rd Edition, PHI. Gonzalez & Woods) ISBN-10: 8131726959 and ISBN-13: 978-8131726952.
2. "*Information Theory and coding*" by Jones and Jones, Springer Publications.
3. "*Digital Communications*" by John G. Proakis (3rd Edition McGraw Hill).

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IT307: ELECTIVE-I:
INFORMATION THEORY AND CODING LAB

Teaching Scheme **P: 2**

Evaluation Scheme	Continuous Evaluation	ESE	Minimum Passing Marks
	30 Marks	70 Marks	40%

Term Work:

1. Instructor will frame programming assignments based on the syllabus using C/C++/Matlab language.
2. Instructor is expected to incorporate variations in list.
3. Students will submit term work in the form of a journal that will include at least 10 practical assignments.

The assessment will be based on the following –

1. Performance in the practical examination.
2. Record of programs submitted by the candidate.
3. Innovation & Creativity.
4. Team building skills.
5. Technical writing skills.

Practical Examination:

Practical examination will be of 3 hours and it includes performance and viva-voce examination based on the term work.

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IT308: WEB TECHNOLOGY LAB-I

Teaching Scheme L:2 P: 2

Evaluation Scheme	Continuous Evaluation 30 Marks	ESE 70 Marks	Minimum Passing Marks 40%Course

Objectives:

1. To study designing the web pages.
2. To study formatting and validating web pages.
3. To study designing web sites and deploying web sites on web servers.

Course Contents:

Unit I A crash course in HTML and CSS (6 Hrs)

Introduction to web development, How to code, test, and validate a web page, How to use HTML to structure a web page, How to use CSS to format the element of a web page, How to use CSS box model for spacing, borders and backgrounds, How to use CSS for page layout.

Unit II More HTML and CSS skills as you need them (4 Hrs)

How to work with links and list, How to work with images, How to work with tables, How to work with forms, How to add audio and video to your website, How to format web page for printing.

Unit III Java script and jQuery Skills (6 Hrs)

How to use Java Script to enhance your web pages, How to use jQuery to enhance your web pages, How to use jQuery mobile to build mobile web sites, Advanced HTML5 and CSS3 features.

Unit IV How to design and deploy a web site (4 Hrs)

How to design a web site, How to deploy a web site on a web server, Introduction to Ajax Technology.

Outcomes:

Students will be able to

1. Design web pages.
2. Format and validate web pages.
3. Design web sites and deploy it on web servers.

Text Books:

1. "*HTML5 and CSS3"* by Zak Ruvalcaba and Anne Boehm (First Edition, Murach's Publication Ltd.) ISBN-978-93-5023-823-3.
2. "*Visual Quickstart Guide Java Script and Ajax*" by Tom Negrino and Dori Smith (Seventh Edition, Pearson Education Ltd.) ISBN-978-81-317-3486-5

Reference Books:

1. "*The Complete Reference HTML and CSS*" by Thomas A. Powell (Fifth Edition, Tata McGraw-Hill Publication Ltd.) ISBN-978-0-07-070194-6

Term Work:

1. Instructor will frame programming assignments based on above syllabus **OR** Mini Project based on above syllabus.
2. Instructor is expected to incorporate variations in list.
3. Students will submit term work in the form of a journal that will include at least 10 practical assignments.

The assessment will be based on the following –

1. Performance in the practical examination.
2. Record of programs submitted by the candidate.
3. Innovation & Creativity.
4. Team building skills.
5. Technical writing skills.

Practical Examination:

Practical examination will be of 3 hours and it includes performance and viva-voce examination based on the term work.

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Third Year U.G. Program in Information Technology

Effective from 2016-17

IT309: SOFTWARE ENGINEERING

Teaching Scheme **L: 3 T: 1**

Evaluation Scheme	MSE	ESE	Minimum Passing Marks
	20 Marks	80 Marks	40%

Course Objectives:

1. To introduce the students with basic principles of Software Engineering
2. To learn the Software Engineering concepts, methodologies and best practices
3. To train the students on Software Engineering principles and approach used in Industry.

Course Contents:

UNIT I (6hr)

INTRODUCTION TO SOFTWARE ENGINEERING: The Evolving role for Software, Software, The changing nature of Software, Legacy Software, Software myths.

A GENERIC VIEW OF PROCESS: Software engineering-a layered technology, A process Framework, The CMMI, Process Pattern, Process Assessment,Personal and Team Process Models, Process Technology, Product and Process.

PROCESS MODELS: Perspective Model, Waterfall Model, The Incremental Process Model, Evolutionary Process Model,Specialized Process Model, The Unified process.

UNIT II (8 hr)

SOFTWARE ENGINEEERING PRACTICE: Software engineering practice, Communication practices,Planning Practices, Modeling Practices, Construction practice, Deployment.

REQUIREMENT ENGINEERING: A Bridge to Design andConstruction, Requirement Engineering Task, Initiatingthe Requirement Engineering, Eliciting Requirements, Developing Use-Cases, Building the Analysis Model, Negotiating Requirements, Validating Requirements.

UNIT III (6hr)

BUILDING THE ANALYSIS MODEL: Requirement Analysis, Analysis Modeling Approaches, Data Modeling Concepts, Object-Oriented Analysis, Scenario-Based Modeling, Flow-Oriented Modeling, Class-Based Modeling, Creating a Behavioral Model.

CREATING AN ARCHITECTURAL DESIGN: Software Architecture,Data Design, Architectural Styles and Patterns, Architectural Design.

UNIT IV (6hr)

PERFORMING USER INTERFACE DESIGN: The Golden Rules, User Interface Analysis and Design, Interface Analysis, Interface Design Steps, Design Evaluation.

TESTING STRATEGIES: A Strategic Approach to Software Testing, Strategic Issues, Test Strategies for Conventional Software, Test Strategies for Object-Oriented Software, Validation Testing, System Testing, The Art of Debugging.

UNIT V (8 hr)

TESTING TACTICS: Software Testing Fundamentals, Black-Box and White-Box Testing, White-Box Testing, Basis Path Testing, Control Structure Testing, Black-Box Testing, and Object-Oriented Testing Methods.

PRODUCT METRICS: Software Quality, A framework for Product Metrics, Metrics for Analysis Model, Metrics for Design Model, Metrics for Source Code, Metrics for Testing, Metrics for Maintenance.

UNIT VI (6hr)

PROJECT SCHEDULING: Basic Concepts, Project Scheduling, Defining a Task Set for the Software Project, Defining a Task Network, Scheduling, Earned Value Analysis.

RISK MANAGEMENT: Reactive vs. Proactive Risk Strategies, Software Risks, Risk Identification, Risk Projection, Risk Refinement, Risk Mitigation, Monitoring, and Management, The RMMM Plan.

Outcomes:-At the end of the course, students will be able to

1. Learn basic principles of Software Engineering.
2. Understand Software Engineering concepts, methodologies and best practices.
3. Learn Software Engineering principles and approach used in industry.

Text Books:

1. *"Software Engineering A Practitioners Approach",* by Pressman R., (6thEdition, Tata McGraw Hill Publication, 2005), ISBN- 978-0-07-070113-7.

Reference Books:

1. Pankaj Jalote "*An Integrated Approach to Software Engineering*", 3rd Edition, Springer, 2005, ISBN: 038720881X.
2. Mall R., "*Fundamentals of Software Engineering*", 2nd Edition, Prentice Hall India, 2004, ISBN: 9788120338197.
3. Vliet H., "*Software Engineering Principles and Practices*", 2nd Edition, John Wiley & Sons, 2000, ISBN-10: 0471975087.

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Effective from 2016-17

IT310: COMPILER DESIGN

Teaching Scheme **L: 3 T: 1**

Evaluation Scheme	MSE	ESE	Minimum Passing Marks
	20 Marks	80 Marks	40%

Course Objectives:

1. To understand, design and implement various phases of compiler.
2. To extend the knowledge of parser by parsing LL parser and LR parser.
3. To understand optimization of codes and runtime environment.

Course Contents:

Unit I Introduction to Compiling (5 Hrs)

Language processors, Structure or Phases of compiler, Analysis and Synthesis model of compiler, Cousins of Compiler, Passes of compiler (Single pass and Multi-pass Compiler), Data structures in Compiler, Compiler Construction Tools, Bootstrapping and Cross Compiler.

Unit II Lexical Analysis (5 Hrs)

Role of the lexical analyzer, Input Buffering, Specification of Tokens, Recognition of Tokens, Finite Automata, From Regular expression to Automata, Design of Lexical Analyzer Generator (Lex).

Unit III Syntax Analysis (12 Hrs)

Introduction, Context- Free Grammars, Writing a grammar. **Top Down Parsing:** Recursive-Descent Parsing, FIRST and FOLLOW, LL (1) Grammars, Non-recursive Predictive Parsing.

Bottom-Up Parsing: Reductions, Handle Pruning, Shift-Reduce parsing, Introduction to LR Parsing, More Powerful LR Parsers.

Unit IV Syntax Directed Translation and Intermediate Code Generator (7 Hrs)

Syntax directed definitions: Inherited and Synthesized attributes, Evaluating an SDD at the nodes of a parse tree, Evaluation orders of SDD's.

Intermediate Code Generation: Variants of syntax trees, Three address code, Types and declarations, Type checking, Control Flow and Backpatching.

Unit V Code Optimization (6 Hrs)

Need of code optimization, Machine dependent optimization and machine independent optimization, Principal sources of optimization, Loop optimization, Basic blocks and Flow graphs, Optimization of basic blocks, Peephole optimization.

Unit VI Runtime Environment and Code Generation (7Hrs)

Runtime Environment: Storage organization, Stack allocation of space, Storage allocation strategies (static allocation, stack allocation, dangling references, heap allocation), Heap management.

Code Generation: Issues in the design of code generation, The target language, Addresses in the target code, Different forms of object codes, Register allocation and assignments.

Outcomes:

1. To acquire the knowledge of modern compiler & its features.
2. To learn & use the new tools and technologies used for designing a compiler.
3. To use the knowledge of patterns, tokens & regular expressions for solving a problem in the field of data mining.

Text Books:

1. "*Compilers-Principles, Techniques and Tools"* by Alfred V.Aho, Monica S. Lam, Ravi Sethi, Jeffrey D.Ullman (2th Edition, Pearson) ISBN-978-81-317-2101-8.
2. "*Compilers-Principles, Techniques and Tools"* by Alfred V.Aho, Monica S. Lam, Ravi Sethi, Jeffrey D.Ullman (Pearson Low Price Edition) ISBN-81-7808-046-X.

Reference Books:

1. "*Compiler Construction Principles and Practice*" by Kenneth C. Louden (PWS Publishing Company, 1997) ISBN 0-534-93972-4.
2. "*Compiler Design*" by O.G.Kakde (4th Edition, University Science Press) ISBN 8170083831.

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IT310: COMPILER DESIGN LAB

Teaching Scheme **P: 2**

Evaluation Scheme	Continuous Evaluation	ESE	Minimum Passing Marks
	30 Marks	70 Marks	40%

Term Work:

- Instructor will frame experiments based on the suggested experiments using gcc compiler, LEX and YACC tools in UNIX environment as given below. Instructors are expected to incorporate variations in list.
- Students will submit Term Work in the form of a journal that will include at least 10-12 experiments from the list given below. Each experiment will consists of pseudo-algorithm, program listing with proper documentation and printout of the output.
- Practical Examination will consist of Performance and Viva-voice Examination based on the term work.

The assessment will be based on the following –

1. Performance in the practical examination.
2. Record of programs submitted by the candidate.
3. Innovation & Creativity.
4. Team building skills.
5. Technical writing skills.

Suggested List of Assignments

Execution of the following programs using C-language:

1. Write a program to implement lexical analyzer.
2. Write a program for conversion of infix expression to prefix and postfix expression.
3. Write a program for implementation of concepts of syntax analysis as a check for
   a) Imbalance parenthesis
   b) Invalid operator
4. Write a program for implementation symbol table using linear list.

Execution of the following programs using LEX tool:

1. Lex program to recognize the identifiers and count no. of identifiers in the input source file.
2. Lex program to recognize and count the Keyword, Numbers and identifiers in the input source file.
3. Lex program to recognize and count the Keyword, Numbers, Symbols, relational operators, identifiers ,deliminators, arithmetic operators in the input source file.
4. Lex program to recognize and count the blank spaces, characters, lines and words in the input source file.
5. Lex program to recognize and count the vowels and consonants in the input source file.
6. Lex program to recognize and count no. of positive integers, negative integers, positive fractions, negative fractions in the input source file.
7. Lex program to recognize a string with three consecutive 0's and strings ending in 00.
8. Program to recognize and count the numbers of comment lines in a given C program. Also eliminate them and copy that program into separate file.
9. Program to implement a complete lexical analyzer for a small language in Lex.
10. Program to count the number of ‘scanf’ and ‘printf’ statements in a C program. Replace them with ‘readf’ and ‘writf’ statements respectively.
11. Program to recognize a valid arithmetic expression and identify the identifiers and operators present. Print them separately.

Execution of the following programs using YACC tool:

12. Program to test validity of a sample expression involving operators +, -,* and /.
13. Program to recognize nested IF control statements and display the number of levels of nesting.
14. Program to recognize a valid variable, which starts with a letter, followed by any number of letters or digits.
15. Program to evaluate an arithmetic expression involving operators +, -, * and /.
16. Program to recognize strings ' aaab', ' abbb', 'ab' and 'a' using the grammar.

Practical Examination:

Practical examination will be of 3 hours and it includes performance and viva-voce examination based on the term work.

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Effective from 2016-17

IT311: COMPUTER NETWORKS

Teaching Scheme **L: 4 T: 0**

Evaluation Scheme	MSE	ESE	Minimum Passing Marks
	20 Marks	80 Marks	40%

Course Objectives:

1. To understand the services offered by Network, Transport and Application Layers of TCP/IP.
2. To learn addressing schemes of TCP/IP protocol.
3. To study different protocols of TCP/IP model.
4. To learn to build TCP/IP based networks.
5. To familiarize with recent trends in networking and multimedia networking.

Course Contents:

Unit I: Introduction (6 Hrs)

Introduction and Overview: The TCP/IP Internet, Internet Services, IAB, Connectionless and connection oriented services, packet switching. TCP/IP Layers, Properties Of The Internet, Internet Architecture, Interconnection Through IP Routers, The User's View, All Networks Are Equal. Classful Internet Addresses, Mapping Internet Addresses To Physical Addresses (ARP), RARP.

Unit II: Network Layer –IP (7 Hrs)

The IPv4 Datagram: Format, Type OF Services & Differentiated Services, Encapsulation, Datagram Size, Network MTU, and Fragmentation, Reassembly Of Fragments, Fragmentation Control, Time to Live (TTL), Other Datagram Header Fields Internet Datagram Options: Record Route Option, Source Route Options, Timestamp Option, Processing Options Fragmentation.
Forwarding IP Datagrams: Forwarding In An Internet, Direct And Indirect Delivery, Table- Driven IP Forwarding, Next-Hop Forwarding, Default Routes, Host-Specific Routes, The IP Forwarding Algorithm, Forwarding With IP Addresses, Handling Incoming Datagrams, Establishing Tables. ICMP, CIDR, Formation of Subnets and Supernets.

Unit III: Transport Layer-TCP and UDP (7 Hrs)

The Need For Stream Delivery, Properties Of The Reliable Delivery Service, Providing Reliability , The Idea Behind Sliding windows , The Transmission Control Protocol, Ports, Connections, And

Endpoints, Passive And Active Opens, Segments, Streams, And Sequence Numbers, Variable Windows Size And Flow Control, TCP Segment Format, Out Of Band Data ,TCP Options TCP Checksum Computation, Acknowledgements, Retransmission, And Timeouts, Accurate Measurement Of Round Trip Samples, Karn's Algorithm And Timer Backoff, Responding To High Variance Feedback Mechanisms (SACK and ECN), Congestion, Tail Drop And TCP, Random Early Detection (RED) Establishing A TCP Connection, Initial Sequence Numbers, Closing a TCP Connection, TCP Connection Reset, TCP State Machine, Forcing Data Delivery, Reserved TCP Port Numbers, TCP Performance, Silly Windows Syndrome And Small Packets, Avoiding Silly Windows Syndrome . User Datagram Protocol (UDP)

Unit IV: Routing & Multicasting (7 Hrs)

Routing: Distance Vector (Bellman –Ford) Routing, Reliability And Routing Protocols, Link- State (SPF) Routing, Exterior Gateway Protocol, BGP Characteristics, BGP Functionality And Massage Types, BGP massage Header, Static Vs Dynamic Interior Routes, RIP, Slow Convergence Problem, Solving The Slow Convergence Problem , RIP 1 Massage Format, OSPF, OSPF Massage Format. Multicasting: Ethernet Multicast, IP Multicast IP Multicast addresses, Mapping IP Multicast To Ethernet Multicast, Internet Group, Management Protocol, IGMP Message Format, Distance Vector Multicast Routing Protocol.

Unit V: Application Layer (7 Hrs)

BOOTP and DHCP: BOOTP, BOOTP Message Format. DHCP and The DHCP Message Format, DHCP Message types options. DNS: Internet Domain Names, Top-Level Domains, Name Syntax and Type, Mapping Domain Name System Message Format. TELNET: TELNET Protocol, Accommodating Heterogeneity, Secure Shell (SSH). FTP: Features, Process Model, TFTP, Anonymous FTP, Secure File Transfer (SSL-FTP, Scp, Sftp). Electronic Mail: Electronic Mail, SMTP, Post Office Protocol, Internet Message Access Protocol, MIME.

Unit VI: Recent Trends and Multimedia Networking (6 Hr)

HTTP and SNMP: Architectural Components, Uniform Resource Locators, Hypertext Transfer Protocol, and SNMP. Transition To IPv6, IPv6 Migration, Dual Stack Systems , The IPv6 Addressing Scheme, IPv6 Colon Hexadecimal Notation, IPv6 Address Space Assignment, Embedding IPv4 Addresses In IPv6 For Transition, Brief Introduction of VPN, NAT, RTP and RTCP.

Course Outcomes:

1. Demonstrate an understanding of the TCP/IP model.
2. To be able to understand and configure IP addresses.
3. Should be able to do the analysis of data traffic on TCP/IP networks.
4. To be able to apply knowledge of TCP/IP in building LAN.

Text Books:

1. *'Internetworking with TCP/IP'* Vol I By D.E. Comer, Fifth Edition, PHI Publications. ISBN: 9788120348677.
2. *'TCP/IP Protocol Suite*' by Behrouz A. Forouzan, Fourth Edition, TMH. ISBN: 978-0073376042.

Reference Books:

1. D.E. Comer, 'Internetworking with TCP/IP' Vol. I , Sixth Edition, PHI Publications.
2. J. Kurose and K.W. Ross, Computer Networking: A Top-Down Approach Featuring the Internal, Addison Wesley.
3. W.R. Stevens, TCP/IP illustrated, Volume 1: The protocols, Second Edition, Addison Wesley.
4. G.R. Wright. TCP/IP illustrated, Volume2: The implementation, Addison, Wesley.
5. Douglas E. Comer, Hands- On Networking with Internet Technologies, Pearson Education, Asia, 2002.

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IT311: COMPUTER NETWORKS LAB

Teaching Scheme **P: 2**

Evaluation Scheme	Continuous Evaluation	ESE	Minimum Passing Marks
	30 Marks	70 Marks	40%

Term Work:

1. Instructor will frame programming assignments based on the suggested list of assignments using C/C++/Java language.
2. Instructor is expected to incorporate variations in list.
3. Students will submit term work in the form of a journal that will include at least 10 practical assignments.

The assessment will be based on the following –

1. Performance in the practical examination.
2. Record of programs submitted by the candidate.
3. Innovation & Creativity.
4. Team building skills.
5. Technical writing skills.

Suggested List of Experiments/Assignments

1) Write a program for shortest path routing algorithm (Dijkstra's algorithm)
2) Write a program simulating Sliding Window Protocols.
3) Write a program to implement client server application.
4) Write a program to implement Distance Vector Routing algorithm.
5) Write a program to implement Remote Command Execution(Two M/Cs may be used)
6) Write a socket program for Echo/Ping/Talk commands.
7) Create a socket for HTTP for web page upload & Download.
8) Write a program for TCP module Implementation (TCP services).
9) Write a program for File Transfer in client- server architecture using TCP sockets.
10) Write program for File Transfer in client-server architecture using UDP sockets.
11) Write a program to implement RMI (Remote Method Invocation)
12) Study of existing LAN and understand the design and various components. Set up a small network of 3 to 4 computers and Hub/switch as directed by the instructor. Use LAN card,

UTP cables and connectors. Install LAN cards and crimp the connectors. Assign unique IP address and share C drive on each machine. Test the network by using PING command. Repeat the same assignment by adding a router. Configure the router and use RIP.

13) Study any protocol analyzer software (such as Ethereal, Wireshark, etc.) to learn and use its important features.
14) Study of FTP and SMTP commands.
15) Write a code simulating ARP/RARP.
16) Study of TELNET.
17) Study of Network Simulators like NS2.

Practical Examination:

Practical examination will be of 3 hours and it includes performance and viva-voce examination based on the term work.

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IT312: UNIX OPERATING SYSTEM

Teaching Scheme **L: 3 T: 1**

Evaluation Scheme	MSE	ESE	Minimum Passing Marks
	20 Marks	80 Marks	40%

Course Objectives:

1. To understand the basic concepts, design and structure of the UNIX operating system.
2. To implement various system calls.
3. To acquire skills in UNIX Shell programming.
4. To learn basics of UNIX system administration.

Course Contents:

Unit I: Introduction (06 Hrs)

General overview of the system - History, System structure, User perspective, Operating system services, Assumption about hardware

Introduction to the KERNEL - Architecture of UNIX OS, Introduction to system concepts, Kernel data structure, System administration.

Unit II: The Buffer Cache (08 Hrs)

Buffer headers, Structure of the buffer pool, Scenarios for retrieval of a buffer, Reading and writing disk blocks, Advantages and disadvantages of cache.

Internal Representation of Files: I-nodes, Structure of the regular file, Directories, Conversion of a pathname to i-node, Super block, I-node assignment to a new file, Allocation of disk blocks, Other file types.

Unit III: System calls for the file System (06 Hrs)

Open, Read, Write, File and Record Locking, Adjusting the position of FILE I/O-LSEEK, Close, File Creation, Creation of Special File, Change Directory and Change Root, Change Owner and Change Mode, Stat and Fstat, Pipes, Dup, Mounting and Un-mounting file systems, Link, Unlink, File System Abstractions, File system maintenance.

Unit IV: The Structure of process (08 Hrs)

Process stages and transitions, layout of system memory, The context of a process, Saving context of a process, Manipulation of the process address space.

Process Control: Process creation, Signals, Process termination, Awaiting process termination, Invoking other programs, The user id of a process, The shell, System Boot and the Init process.

Unit V: Process Scheduling and Time **(06 Hrs)**

Process Scheduling, System call for time, Clock.
Memory management policies: Swapping, Demand passing, A hybrid system with demand paging and swapping

Unit VI: The I/O Subsystem **(06 Hrs)**

Driver interfaces, Disk drives, Terminal drivers, Streams.
Inter-Process communication: Processing Tracing, System V IPC, Network communications, Sockets

Outcomes: By the end of this course, students will be able to:

1. Learn UNIX structure, commands, and utilities.
2. Describe and understand the UNIX file system.
3. Write shell scripts in order to perform shell programming.
4. Acquire knowledge about text processing utilities, process management and system operation of UNIX.

Text Books

1. Maurice. J. Bach, "*The Design of the UNIX operating System*", PHI. ISBN-13: 978-8120305168.

Reference Books

1. Sumitabha Das, "*Unix concepts and administration*" 4th Edition – Tata McGraw Hill. ISBN-13: 978-0070635463.
2. Robert Love, "Linux System Programming" SPD, O' REILLY. ISBN-13**:** 978-9351107729.
3. Richard Stevens, "UNIX Network Programming", PHI. ISBN-13: 978-0139498763
4. John Muster, "UNIX made easy", 3rd Edition, TMH Edition. ISBN-13: 9780072193145.
5. Meeta Gandhi,Rajiv Shah,Tilak Shety,Vijay Mukhi , "The C Odyssey: UNIX-The Open Boundless C" BPB Publications. ISBN-13: 978-8170291657.

Swami Ramanand Teerth Marathwada University, Nanded

Third Year U.G. Program in Information Technology

Effective from 2016-17

IT312: UNIX OPERATING SYSTEM LAB

	Teaching Scheme		**P: 2**
Evaluation Scheme	**Continuous Evaluation 30 Marks**	**ESE 70 Marks**	**Minimum Passing Marks 40%**

Term Work:

1. The instructor will frame programming assignments based on the suggested list of assignments.
2. Instructors are expected to incorporate variations in list.
3. Students will submit term work in the form of a journal that will include at least 10 practical assignments.

The assessment will be based on the following

1. Performance in the practical examination.
2. Record of programs submitted by the candidate.
3. Innovation & Creativity.
4. Team building skills.
5. Technical writing skills.

Suggested List of Assignments:

1. Introduction to shell and execute simple shell programs.
2. To execute Shell programs using Decision making statements.
3. To execute Shell programs using Loop Control statements.
4. Study & demonstration of how the Linux Kernel implements and Manages files.
5. Study & demonstration of User Buffer I/O - Observe practically by writing 'C' program.
6. Study and demonstration of Advanced File I/O.
7. Study and demonstration of Unix Process. Management – from process creation to process termination.
8. Study and Demonstration of the File and Directory Management.

9. Study and demonstration of Memory Management.
10. Study and Demonstration of Signals.
11. Study and configure DHCP server.
12. Study of different RAID levels and configuration of RAID partitions.
13. Configuration of yum.
14. Study and configure FTP server.
15. Study and configure Proxy server / SQUID.

Practical Examination:

Practical examination will be of 3 hours and it includes performance and viva-voce examination based on the term work.

Swami Ramanand Teerth Marathwada University, Nanded

Third Year U.G. Program in Information Technology

Effective from 2016-17

IT313: ELECTIVE-II
PYTHON PROGRAMMING

Teaching Scheme **L: 3 T: 1**

Evaluation Scheme	**MSE**	**ESE**	**Minimum Passing Marks**
	20 Marks	**80 Marks**	**40%**

Course Objectives:

1. To learn and understand Python programming basics and paradigm.
2. To learn and understand python looping, control statements and string manipulations.
3. Students should be made familiar with the concepts of GUI controls and designing GUI applications.
4. To learn and know the concepts of file handling, exception handling and database connectivity.

Course Contents:

Unit I Introduction **(7 Hrs)**

Introduction to Programming Languages: Program and programming paradigms, Programming languages- classification and characteristics.
Building Blocks of Program: Data, Data Types, Data Binding, Variables, Constants, Declaration, Operations on Data such as assignment, arithmetic, relational, logical operations.
Introduction to Python Programming: Features, basic syntax, Writing and executing simple program, Basic Data Types such as numbers, strings, etc Declaring variables, Performing assignments, arithmetic operations, Simple input-output.

Unit II Sequence Control, Looping, String Manipulations **(7 Hrs)**

Sequence Control – Precedence of operators, Type conversion, **Conditional Statements:** if, if-else, nested if –else, **Looping:** for, while, nested loops, **Control statements:** Terminating loops, skipping specific conditions, **String Manipulation:** declaring strings, string functions.
Manipulating Collections: Lists, Tuple.

Unit III Dictionaries, Functions and Modules **(6 Hrs)**

Dictionaries: Concept of dictionary, techniques to create, update & delete dictionary items.
Functions: Defining a function, calling a function, advantages of functions, types of functions, function parameters, formal parameters, actual parameters, anonymous functions, global and local variables
Modules: Importing module, Creating & exploring modules, Math module, Random module, Time module.

Unit IV GUI Programming in Python (6 Hrs)

What is GUI, advantages of GUI, Introduction to GUI library? , Layout management, Events and bindings, Font, Colors, drawing on canvas (line, oval, rectangle, etc.) Widget such as: Frame, Label, Button, Check button, Entry, List box, Message, Radio button, Text, Spin box etc

Unit V Python Files and Exception Handling (7Hrs)

Python File Input-Output: Opening and closing file, various types of file modes, reading and writing to files, manipulating directories, Command-line Arguments
Exception Handling: What is exception, various keywords to handle exception such try, catch, except, else, finally, raise.

Unit VI Database connectivity (7 Hrs)

Database connectivity in Python: Installing mysql connector, accessing connector module, using connect, cursor, execute & close functions, reading single & multiple results of query execution, executing different types of statements, executing transactions, understanding exceptions in database connectivity.
Searching and Sorting Techniques: Searching and sorting techniques, Efficiency of algorithms.

Outcomes:

Upon successful completion of this course, the student will be able to:

1. Define and demonstrate the use of built-in data structures “lists” and “dictionary”.
2. Design and implement a program to solve a real world problem.
3. Design and implement GUI application and how to handle exceptions and files.
4. Make database connectivity in python programming language.

Text Books:

1. “*Introduction to Computer Science using Python*” by Charles Dierbach (Wiley publisher,2013) ISBN-10:0470555157 and ISBN-13: 978-0470555156.

2. "*Practical Programming: An Introduction to Computer Science Using Python 3"* by Paul Gries, Jennifer Campbell, Jason Montojo (2nd Edition, Pragmatic Bookshelf, 2010) ISBN-978-1-93778-545-1.
3. "*Beginning Python: Using Python 2.6 and Python 3"* by James Payne (Ist Edition, Wiley India, 2010) ISBN: 978-0-470-41463-7.

Reference Books:

1. "*MySQL for Python: Database Access Made Easy"* by A. Lukaszewski (Packt Publisher, 2010) ISBN -10: 1849510180 & ISBN-13:978-1849510189.
2. "*Core Python programming"* by Chun. J. Wesley (2nd Edition, Prentice Hall, 2007 Reprint 2010) ISBN-10:0-13-226993-7 & ISBN-13:978-0-13-226993-3.
3. "*Head First Python"* by Barry and Paul (2nd Edition, O Rielly, 2010) ISBN-10:1-4493-8267-3.
4. "*Learning Python"* by Lutz and Mark (4th Edition, O Rielly, 2009) ISBN-978-0-596-15806-4 and ISBN-10:0-596-15806-8.

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Third Year U.G. Program in Information Technology

Effective from 2016-17

IT313: ELECTIVE-II
PYTHON PROGRAMMING LAB

Teaching Scheme **P: 2**

Evaluation Scheme	**Continuous Evaluation**	**ESE**	**Minimum Passing Marks**
	30 Marks	**70 Marks**	**40%**

Term Work:

1. Instructor will frame programming assignments based on the suggested list of assignments using Python language.
2. Instructor is expected to incorporate variations in list.
3. Students will submit term work in the form of a journal that will include at least 10 practical assignments.

The assessment will be based on the following –

1. Performance in the practical examination.
2. Record of programs submitted by the candidate.
3. Innovation & Creativity.
4. Team building skills.
5. Technical writing skills.

Suggested list of Experiments/Programs.

1. a) Program to print "Hello World".
   b) Program to add two numbers.
   c) Program to find square root of a number.
   d) Program to calculate area of triangle.
2. a) Program to find number of odd and even numbers.
   b) Program to check leap year.
   c) Program to find factorial of n number and find Fibonacci series using recursion.
3. a) Program to find sum of natural numbers.
   b) Program for the conversion of decimal to binary, octal and hexadecimal.
   c) Program to find the ASCII value of characters.
4. a) Program to find LCM, HCF and GCD.
   b) Program to find the largest of three numbers.

5. Program to demonstrate the use of regular expressions.
6. Program to draw shapes.
7. Program to show GUI controls and processing.
8. Program to show database connectivity.
9. a) Programs for reading and writing to a file.
   b) Program to demonstrate exception handling.
10. Programs to do searching and sorting.
11. Program to explore string functions.
12. Implement sequential search.
13. Implement Selection sort.

Practical Examination:

Practical examination will be of 3 hours and it includes performance and viva-voce examination based on the term work.

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Third Year U.G. Program in Information Technology

Effective from 2016-17

IT314: ELECTIVE- II: ADVANCED DATABASE MANAGEMENT SYSTEMS

Teaching Scheme L: 3 T: 1

Evaluation Scheme	MSE	ESE	Minimum Passing Marks
	20 Marks	80 Marks	40%

Course Objectives:

1. To understand the different issues involved in the design and implementation of a distributed and object oriented database systems.
2. To model database using UML.
3. To understand and use XML for designing database systems.
4. To familiarize with security concepts in databases.

Course Contents:

Unit I: The Enhanced Entity-Relationship (EER) Model (6 Hrs)

Subclasses, Superclasses, and Inheritance , Specialization and Generalization, Constraints and Characteristics of Specialization and Generalization Hierarchies, Modeling of UNION Types Using Categories, A Sample UNIVERSITY EER Schema, Design Choices, and Formal Definitions , Example of Other Notation: Representing Specialization and Generalization in UML Class Diagrams, Data Abstraction, Knowledge Representation, and Ontology

Unit II: Practical Database Design Methodology and Use of UML Diagrams (5 Hrs)

The Role of Information Systems in Organizations, The Database Design and Implementation Process, Use of UML Diagrams as an Aid to Database Design Specification, Rational Rose: A UML-Based Design Tool, Automated Database Design Tools.

Unit III: Object, Object-Relational, and XML Models (7 Hrs)

Object and Object-Relational Databases: Overview of Object Database Concepts, Object-Relational Features: Object Database Extensions to SQL, The ODMG Object Model and the Object Definition Language ODL, Object Database Conceptual Design, The Object Query Language OQL , Overview of the C++ Language Binding in the ODMG Standard .XML: Structured, Semistructured, and Unstructured Data, XML Hierarchical (Tree) Data Model, XML Documents, DTD, and XML Schema, Storing and

Extracting XML Documents from Databases, XML Languages, Extracting XML Documents from Relational Databases.

Unit IV: Distributed Databases (8 Hrs)

Distributed Database Concepts, Types of Distributed Database Systems, Distributed Database Architectures, Data Fragmentation, Replication, and Allocation Techniques for Distributed Database Design, Query Processing and Optimization in Distributed Databases, Overview of Transaction Management in Distributed Databases, Overview of Concurrency Control and Recovery in Distributed Databases, Distributed Catalog Management, Current Trends in Distributed Databases, Distributed Databases in Oracle.

Unit V: Database Security (7 Hrs)

Introduction to Database Security Issues, Discretionary Access Control Based on Granting and Revoking Privileges, Mandatory Access Control and Role-Based Access Control for Multilevel Security, SQL Injection, Introduction to Statistical Database Security, Introduction to Flow Control, Encryption and Public Key Infrastructures, Privacy Issues and Preservation, Challenges of Database Security,Oracle Label-Based Security.

Unit VI: Information Retrieval, Web Search and Advanced Databases (7 Hrs)

Enhanced Data Models for Advanced Applications: Active Database Concepts and Triggers, Temporal Database Concepts, Spatial and Geographic Database, Multimedia Database Concepts, Introduction to Deductive Databases, Time in Databases, Mobility and Personal Databases. **Information Retrieval (IR):** Concepts, Retrieval Models, Types of Queries in IR Systems, Text Preprocessing, Inverted Indexing, Evaluation Measures of Search Relevance, Web Search and Analysis, Trends in Information Retrieval.

Course Outcomes:

1. Demonstrate an understanding of the object oriented and distributed data models.
2. Create database systems using xml.
3. Demonstrate ability to prepare UML diagrams for information systems.
4. Formulate, using SQL, solutions to a broad range of query and data update problems.

Text Books:

1. *"Fundamentals of Database Systems",* by Elmarsi, Navathe, Somayajulu, Gupta, Sixth Edition. Pearson Education. ISBN 9788131758984
2. *"Database System Concepts"* by Avi Silberschatz, Henry F. Korth, S. Sudarshan, Sixth Edition, McGraw-Hill. ISBN 9780071325226

Reference Books:

1. *"Database Management System",* by Raghu Ramakrishnan, Tata McGraw-Hill Publishing Company 2003.ISBN 978-0072465631

2. "*Database System Implementation*" by Hector Garcia–Molina, Jeffrey D.Ullman and Jennifer Widom, Pearson Education- 2000. ISBN 978-0130402646

3. "*Database System Concepts*" by Peter Rob and Corlos Coronel, Cengage Learning Edition 2008. ISBN 9788131514405.

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Third Year U.G. Program in Information Technology

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IT314: ELECTIVE-II: ADVANCED DATABASE MANAGEMENT SYSTEMS LAB

Teaching Scheme **P: 2**

Evaluation Scheme	**Continuous Evaluation**	**ESE**	**Minimum Passing Marks**
	30 Marks	**70 Marks**	**40%**

Term Work:

1. Instructor will frame programming assignments based on the suggested list of assignments using Oracle / MySQL Server / MS SQL Server / XML / Java / UML.
2. Instructor is expected to incorporate variations in list.
3. Students will submit term work in the form of a journal that will include at least 8 practical assignments or mini-project based on syllabus.

The assessment will be based on the following –

1. Performance in the practical examination.
2. Record of programs submitted by the candidate.
3. Innovation & Creativity.
4. Team building skills.
5. Technical writing skills.

Suggested list of Experiments/Programs.

1. Basic SQL
2. Intermediate SQL
3. Advanced SQL
4. ER Modeling
5. Database Design and Normalization
6. Accessing Databases from Programs using JDBC
7. Building Web Applications using PHP & MySQL
8. Indexing and Query Processing
9. Query Evaluation Plans

10. Concurrency and Transactions
11. Big Data Analytics using Hadoop

Practical Examination:

Practical examination will be of 3 hours and it includes performance and viva-voce examination based on the term work.

Swami Ramanand Teerth Marathwada University, Nanded

Third Year U.G. Program in Information Technology.

Effective from 2016-17

IT315: ELECTIVE-II: COMPUTER ORGANIZATION AND ARCHITECTURE

Teaching Scheme L: 3 T: 1

Evaluation Scheme	MSE	ESE	Minimum Passing Marks
	20 Marks	80 Marks	40%

Course Objectives:

1. To elaborate concepts of Processors and Memory Hierarchy.
2. To assess computer performance and understand I/O and properties of ISA.
3. To introduce enhancement of processing using pipelining.
4. To put some light on Advanced Architecture Concepts.

Course Contents:

Unit I (7 Hrs)

Introduction, Organization and architecture, Structure and function, Example Computer Families, Processors, CPU Organization, Instruction Execution, RISC versus CISC, Design Principles for Modern, Computers, Instruction-Level Parallelism, Processor-Level Parallelism, Cache Memory, Internal Memory Technology.

Unit II (6 Hrs)

Assessing and understanding performance, Introduction, CPU performance and its factors, Evaluating performance, Amdahl's law, SPEC benchmark and the performance of recent Intel processors,

Unit III (7 Hrs)

Secondary memory, Memory Hierarchies, Magnetic Disks, IDE Disks, SCSI Disks, RAID, Solid-State Disks, CD-ROMs, CD-Recordable, CD-Rewritable, DVD, Blu-ray, Input/Output, Buses, Terminals, Mice, Game Controllers, Printers, Telecommunications Equipment, Digital Cameras, Character Codes

Unit IV (6 Hrs)

Overview of the ISA level, Properties of the ISA Level, Memory Models, Registers, Overview of the Core i7 ISA Level, Overview of the OMAP4430 ARM ISA Level , Overview of the

ATmega168 AVR ISA Level, Instruction formats, Design Criteria for Instruction Formats, Expanding Opcodes, The Core i7 Instruction Formats, The OMAP4430 ARM CPU Instruction Formats, The ATmega168 AVR Instruction Formats

Unit V **(8 Hrs)**

Parallel Computer Architectures, On-chip Parallelism, Instruction-Level Parallelism, On-Chip Multithreading, Single-Chip Multiprocessors, COPROCESSORS, Network Processors, Graphics Processors, Crypto processors, SHARED-MEMORY MULTIPROCESSORS, Multiprocessors vs. Multicomputer, Memory Semantics, UMA Symmetric Multiprocessor Architectures, MESI, NUMA Multiprocessors, COMA Multiprocessors

Unit VI **(6 Hrs)**

Reduced Instruction Set Computers (RISCs), Instruction Execution Characteristics, the Use of a Large Register File, Compiler-Based Register Optimization, Reduced Instruction Set Architecture, RISC Pipelining, MIPS R4000, SPARC

Outcomes:

1. To have understanding with clarity and completely, the nature and characteristics of modern-day computer organization
2. To gain knowledge for contemporary architectures like Intel's Core I-7, ARM and ATmega series

Text Books:

1. *"Structured Computer Organization"* by Andrew s. Tanenbaum (Sixth Edition, Pearson), ISBN-13: 978-0132916523
2. *"Computer Organization and Design-The hardware/Software Interface" by* David A. Patterson and John L. Hennessy (Third Edition, Elsevier), ISBN-13: 9781558606043

Reference Books:

1. *"Computer Organization And Architecture Designing For Performance"* by William Stallings (Eighth Edition, Prentice Hall), ISBN: 9788131732458

Swami Ramanand Teerth Marathwada University, Nanded

Third Year U.G. Program in Information Technology.

Effective from 2016-17

IT315: ELECTIVE-II: COMPUTER ORGANIZATION AND ARCHITECTURE LAB

Teaching Scheme **P: 2**

Evaluation Scheme	**Continuous Evaluation**	**ESE**	**Minimum Passing Marks**
	30 Marks	**70 Marks**	**40%**

Lab Objective:

1. To understand the functionality of the various modules of a computer system.

2. To build computer systems from components.

Lab Contents:

Unit I: Motherboard & Its Component

CPU – Concept like address lines, data lines, internal registers, Modes of operation of CPU– Real mode, IA-32 mode, IA-32 Virtual Real Mode, Process Technologies-, Dual Independent Bus Architecture, Hyper Threading Technologies & its requirement, Processor socket & slots, Chipset basic, chipset Architecture, North / South bridge & Hub Architecture, Latest chipset for PC, Overview & features of PCI, PCI–X, PCI express, AGP bus, Logical memory organization, conventional memory, extended memory, expanded memory. Overview & features of SDRAM, DDR, DDR2, DDR3, Concept of Cache memory: L1 Cache, L2 Cache, L3 Cache, Cache Hit & Cache Miss. BIOS – Basics & CMOS Set Up. Motherboard Selection Criteria.

Unit II: Storage Devices & Interfacing.

Recording Techniques: FM, MFM, RLL, perpendicular recording, Hard Disk construction and working. Terms related to Hard Disk: Track, sector, cylinder, cluster, landing zone, MBR, zone recording, write pre-compensation. Formatting: Low level, High level & partitioning. FAT Basics: Introduction to file system, FAT 16, FAT 32, NTFS, Hard Disk Interface: Features of IDE, SCSI, PATA, SATA, Cables& Jumpers. CD ROM Drive: Construction, recording.(Block diagram), DVD: Construction, Recording. (Block Diagram), Blue-ray Disc specification.

Unit III: Display Devices & Interfacing

CRT: Block diagram & working of monochrome & color Monitor, Characteristics of CRT Monitor: DOT Pitch, Resolution, Horizontal Scanning frequency, Vertical scanning frequency,

Interlaced Scanning, Non-Interfaced scanning , Aspect ratio. LCD Monitor: - Functional Block Diagram of LCD monitor, working principle, Passive matrix, Active matrix LCD display. Touch Screen Display – The construction and working principle. Plasma Display Technology: - Construction & working principle. Basic Block Diagram of Video Accelerator card.

Unit IV: Input and Output Devices

Keyboard: Types of key switches: Membrane, Mechanical, Rubber dome, Capacitive, optoelectronic and interfacing. Mouse: Opto-mechanical, optical (New design), Scanner: Flat Bed, Sheet-fed, Handheld: Block diagram of flat Bed and specifications, OCR, TWAIN, Resolution, Interpolation. Modem: Internal and External: Block diagram and specifications. Printer: Printer Characteristics, Dot matrix, Inkjet, Laser: block diagram and specifications.

Unit V: Power Supplies

Block diagram and working of SMPS. Signal description and pin-out diagram of AT and ATX connectors. Power supply characteristics: Rated wattage, Efficiency, Regulation, Ripple, Load regulation, Line regulation. Power problems: Blackout, Brownout, surges and spikes. Symptoms of power problems. Protection devices: circuit breaker, surge suppressor. Uninterrupted Power Supply, ONline and OFFline UPS, working of UPS: Block diagram, advantages and disadvantages, Ratings.

Unit VI: Interfaces

SCSI, SCSI cables and connectors, SCSI drive configuration. USB features. RS 232 : (Voltages and 9 pin description) Centronics (interface diagram, important signals and timing waveform) Firewire features **PC Troubleshooting, Maintenance and Tools**: POST: POST sequence, Beep codes, visual display codes. Preventive maintenance: Active, Passive, periodic maintenance procedure. Diagnostic Tools: logic Analyzer, logic probe. Diagnostic software for trouble shooting PC. BGA workstation and its applications for reballing of north bridge and south bridge.

Lab Outcomes:

1. Ability to build computer systems from components for various specifications.

2. Gaining knowledge on the architecture of the computer systems.

Reference Books

1. ‘Upgrading & Repairing PCs’ by Scott Muller, Pearson. ISBN: 978-0-7897-5610-7
2. ‘The Complete PC Upgrade & Maintenance guide’ by Mark Minasi, Wiley India. ISBN: 9788126506279
3. ‘PC Upgrade and Repair’ by Barry Press and Maricia Press, Wiley India.ISBN: 978-0-76457317-0

4. ‘Bigelow’s Troubleshooting, Maintaining & Repairing PCs’ by Begelow Tata McGraw Hill. ISBN: 978-0070473676
5. ‘Managing & Troubleshooting PCs’ by Mike Meyers, Scott Jernigan by Tata McGraw Hill. ISBN: 978-0-470-04180-2
6. ‘Computer Installation & Servicing’ by D.Balasubramanian, Tata McGraw Hill. ISBN: 9780070591189

Term Work:

1. Instructor will frame programming assignments based on the suggested list of assignments.
2. Instructor is expected to incorporate variations in list.
3. Students will submit term work in the form of a journal that will include at least 10 practical assignments.

The assessment will be based on the following –

1. Performance in the practical examination.
2. Record of programs submitted by the candidate.
3. Innovation & Creativity.
4. Team building skills.
5. Technical writing skills.

Suggested List of Practicals:

1. Comparative study of motherboards from INTEL, AMD and ARM with focus on performance.
2. Identify and draw the motherboard layout of Intel i3, i5 and i7 processor and understand connection and layout of the chipsets such as H67, P67, etc.
3. Perform Basic Input/output System (BIOS) setting and configuration setup using Complementary Metal Oxide Semiconductor (CMOS).
4. Study of memory sub systems with focus on performance.
5. Format, partition and install a Hard Disk Drive (HDD) and format a pen drive.
6. Understand layout, characteristics and functions of different components of Hard Disk Drive (HDD) as a storage device.
7. Install Video Graphics Array (VGA) or Super Video Graphics Array (SVGA) display cards.
8. Study of GPUs using NVIDIA boards.

9. Study of Reconfigurable hardware using FPGA boards.
10. Install and understand the working of printer.
11. Install and understand the working of Input/output devices such as scanner and modem.
12. Connect Switched Mode Power Supply (SMPS) and identify different parts of SMPS.
13. Understand the working of SMPS and Uninterrupted Power Supply (UPS).
14. Use diagnostic software to identify installed computer peripherals and test their working condition.
15. Find faults related to Monitor, CPU, Hard disk, Printer and other peripherals.
16. Assemble PC and install an operating system.

Practical Examination:

Practical examination will be of 3 hours and it includes performance and viva-voce examination based on the term work.

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Third Year U.G. Program in Information Technology

Effective from 2016-17

IT316: PROFESSIONAL APTITUDE AND LOGICAL REASONING

Teaching Scheme **L: 2**

Evaluation Scheme	**MSE**	**ESE**	**Minimum Passing Marks**
	20 Marks	**80 Marks**	**40%**

Course Objectives:

The students should

1. Develop a deep sense of analysis towards solving a problem
2. Supplement his/her problem solving skills
3. Develop critical thinking
4. Boost his/her ability to work with numbers
5. Augment a student's attention to detail
6. Enhance their spoken and written English Language

Unit 1 focuses on the enhancement of English Language levels of the students.
Unit 2 focuses on the development of sense of analysis, numerical ability and arithmetical reasoning.
Unit 3 works on improving the attention to detail and critical reasoning/thinking of the student. It helps in the improvement of the student's ability to think creatively and generate new ideas. It helps develops the ability of students to logically deduct inferences.

Course Contents:

Unit I: English **(05 Hrs.)**
Sentence completion, Error Correction, Reading Comprehension

Unit II: Quantitative Aptitude **(08 Hrs.)**
Number Systems, Averages, Percentages, Ratio and Proportion, Time Work and Distance, Permutations and Combinations, Probability

Unit III: Data Interpretation and Logical Reasoning **(07 Hrs.)**
Data Analysis, Analytical Puzzles, Verbal Reasoning, Non Verbal Reasoning, Critical Reasoning

Outcomes: By the end of the course the student should be able to:

1. Identify, construct and compute numerical situations by work with numbers
2. Conceive and develop a methodology for analyzing and solving a problem
3. Analyze and interpret data
4. Develop and modify attention to detail
5. Define, modify and apply critical thinking to real time situations
6. Construct and design a structured approach to solving a given analytical situation

This subject will also help in developing the ability to solve situations and problems in exams such as Common Aptitude Test (conducted by the IIMs), GRE, GMAT and the aptitude part of GATE.

Text Books

1. "A Modern Approach to Logical Reasoning*"* by R. S. Agrawal (8th Edition, Chand& Company Ltd.) ISBN-9971-51-283-1.
2. "High School English Grammar and Composition" by Wren and Martin (Multicolor Edition, S. Chand& Company Ltd.) ISBN-81-219-2197-X
4. "Magical Book on Quicker Maths" by M Tyra (DSC Publication) ISBN 978-8190458924

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Effective from 2016-17

IT317. WEB TECHNOLOGY LAB-II

Teaching Scheme L:2 P: 2

Evaluation Scheme	Continuous Evaluation	ESE	Minimum Passing Marks
	30 Marks	70 Marks	40%

Note: This Lab should have Term Work based on the below syllabus of Web Technology and the syllabus of Software Engineering (IT309).

Course Objectives:

1. To design and deploy web application using servlets.
2. To design and deploy web application using JSPs.
3. To design and deploy web application using PHP.

Course Contents:

Unit I Servlets and JSP (7 Hrs)

Writing servlets and JSPs, Deploying servlets and JSPs, Naming your servlets, Using Apache Ant, Altering the format of JSPs, Dynamically including content in servlets and JSPs, Handling web form data in servlets and JSPs, Uploading files, Handling exceptions in web application.

Unit II Session Tracking (6 Hrs)

Session tracking, Integrating Java Script with servlets and JSPs, Sending non HTML content, Logging message from servlets and JSPs, Binding accessing and removing attribute in web applications, Embedding multimedia in JSPs, Working with the client request, Accessing database.

Unit III PHP (3 Hrs)

PHP Language Structure: The building blocks of PHP, Flow control functions in PHP, Working with functions, Working with arrays, Working with objects.

Unit IV PHP and MySQL (4 Hrs)

Getting involved with the code: Working with strings dates and time, Working with forms, Working with Cookies and user sessions, Working with files and directories, Working with images.

PHP and MySql Integration: Interacting with MySql using PHP.

Outcomes:

Students will be able to

1. Design and deploy web application using servlets.
2. Design and deploy web application using JSPs.
3. Design and deploy web application using PHP.

Text Books:

1. "*Java Servlet & JSP Cookbook"* by BruceW. Perry (First Edition, O'Reilly Publication Ltd.) ISBN-978-81-7366-822-7.
2. "*PHP,MySQL and Apache*" by Julie C. Meloni (Sixth Reprint, Pearson Education Ltd.) ISBN-978-81-317-2394-4.

Reference Books:

1. "*Learning PHP and MySQL*" by Michele E. Davis and Jon A. Phillips (2nd Edition, O'Reilly Publication Ltd.) ISBN-978-81-8404-371-6.
2. "*Head First Servlets and JSP*" by Bryan Basham, Kathy Sierra and Bert Bates (2nd Edition, O'Reilly Publication Ltd.) ISBN-978-81-8404-497-3.

Term Work:

1. Students will submit term work in the form of a journal that will include : **(i)** At least 06 practical assignments **OR** One Mini-Projects based on above syllabus contents and **(ii)** 4 assignments / practicals / case studies based on syllabus of Software Engineering (IT 309).
2. Instructor will frame programming assignments based on the above syllabus contents.
3. Instructor is expected to incorporate variations in list.

The assessment will be based on the following –

1. Performance in the practical examination.
2. Record of programs submitted by the candidate.
3. Innovation & Creativity.
4. Team building skills.
5. Technical writing skills.

Practical Examination:

Practical examination will be of 3 hours and it includes performance and viva-voce examination based on the term work.

Swami Ramanand Teerth Marathwada University, Nanded

Third Year U.G. Program in Information Technology

Effective from 2016-17

IT318: SEMINAR

Evaluation Scheme	Continuous Evaluation	Minimum Passing Marks
	50 Marks	40%

Objectives

1. To develop soft skill.
2. To study and understand current trends in Information Technology and prepare presentation material.
3. To improve oral communication skills through presentation.
4. To prepare original technical write up on the presentation.

Methodology

1. To choose the area of interest
2. To identify current literatures
3. To choose state of the art survey paper/research paper
4. To consult and get confirmed with Seminar Coordinator (Faculty)
5. To prepare the PPT
6. To present as per schedule drawn by Seminar Coordinator
7. To prepare a technical write up and submit to Seminar Coordinator

Outcomes

1. Improvement in proficiency in English
2. Improvement in presentation skill
3. Improvement in analytical and reasoning ability
4. Improvement in technical writing

Evaluation criteria

The Seminar is to be carried out in a batch of maximum two students. Seminar should be delivered by individual student using multimedia presentation and report should be submitted preferably using Latex. The assessment will be based on the following:

- Literature Survey
- Quality of Topic Selected & Preparation of Report
- Presentation Skill
- Discussion (with Audience)
- Final Report
- Participation (including Regularity)

General suggestions and expectations / guidelines

- The Seminar topics should be related to Computer Science, and may be of interdisciplinary nature.
- Textual topics will not be permitted.
- References for the topics should be from recent standard journals or magazines of IEEE or any other professional societies of Computer Science
- A topic should have at least 2 references.
- The Reference paper should not be reproduced exactly as the Seminar report.
- Topics already taken by students in the previous years will not be permitted.
- The students must arrange regular meetings with the guide and present progress of Seminar work.
- A Spiral bound Seminar report to be prepared as per the guidelines and format given by the department
- The guides are advised to check for the formatting of the presentation and seminar report.
- Students must submit a report well before the end of the semester.

Format of Seminar Report

1. Use the A4 paper size (21cm x 29.7cm). All printed material including text, illustrations, and charts, must be kept within a print area. Top and bottom margins are 1.0 Inch and 1.0 Inch, respectively, left and right margins are 1.5 Inch and 1.0 Inch respectively. All text must be in a one column format. Text must be fully justified.
2. **Chapter title:** The Chapter title (on the first page of chapter) should centered, and in **Times 16-point, boldface** type. Capitalize the first letter of nouns, pronouns, verbs,

adjectives, and adverbs; **do not** capitalize articles, co-ordinate conjunctions, or prepositions.

3. **Text:** Type main text in Times **12-point**, **1.5-spaced**.Do not use **double-spacing**. All paragraphs should be indented 1 pica (12 point or 0.5 Inch). Be sure text should be **fully justified** - that is, flush left and flush right. There should be **no blank space** between paragraphs. Use **boldface and italic** to emphasize important words/Equations.
4. **Figures and Tables:** Figure captions should be below the figures; table captions should be above the tables. **Avoid** placing **figures and tables** before their mentioning in the text. Use the abbreviation "Fig. 1," even at the beginning of a sentence.
5. **Equations:** Number the equations consecutively with equation numbers in parentheses flush with the right margin, as in (1). Use parentheses to avoid ambiguities in the denominator. Punctuate equations with commas or periods when they are part of a sentence. Be sure that the symbols in your equation have been defined before the equation appears or immediately. Equations must be typed using Equation Editors.
6. **References:** References are important to the reader; therefore, each citation must be complete and correct. List and number all bibliographical references in Times **12-point**, **single- spaced**, at the end of your paper. When referenced in the text, enclose the citation number in square brackets, for example [1].

   Example: [1] A.B.Name1 and C. Name2, "Paper title," IEEE Journal, vol., no. , month, Year, page

   [2] A.B.Name, Book Title, Editor, City: Year, pages.

   [3] D.E.Name, "Title," in Proceedings of the IEEE Conference, Year, IEEE CODE Number, pages.
7. **Page No. :** Print page Number at the bottom center of the page.