## DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

## PUNJABI UNIVERSITY, PATIALA

# Scheme and Syllabi

**for**

## B. Tech. (Computer Science & Engineering)

## Batch 2020

## FACULTY OF ENGINEERING AND TECHNOLOGY
## PUNJABI UNIVERSITY, PATIALA

**B. TECH SECOND YEAR**
**COMPUTER SCIENCE & ENGINEERING**

**(Batch 2020)**
**Session (2021-22)**

**SCHEME OF PAPERS**

**THIRD SEMESTER (COMPUTER SCIENCE & ENGINEERING)**

| S. No. | Subject Code | Subject Name | L | T | P | Cr. |
|---|---|---|---|---|---|---|
| 1. | CPE-201 | Computer System Architecture | 3 | 1 | 0 | 3.5 |
| 2. | CPE-202 | Python Programming | 3 | 1 | 0 | 3.5 |
| 3. | CPE-203 | Data Structures | 3 | 1 | 0 | 3.5 |
| 4. | CPE-204 | Computer Networks | 3 | 1 | 0 | 3.5 |
| 5. | CPE-205 | Discrete Mathematical Structures | 3 | 1 | 0 | 3.5 |
| 6. | CPE-206 | Database Management System | 3 | 1 | 0 | 3.5 |
| 7. | CPE-252 | Python Programming Lab | 0 | 0 | 2 | 1.0 |
| 8. | CPE-253 | Data Structures Lab | 0 | 0 | 2 | 1.0 |
| 9. | CPE-256 | Database Management System Lab | 0 | 0 | 2 | 1.0 |
| 10. | ** | Punjabi | 3 | 0 | 0 | 0.0 |
| 11. | ** | Environment and Road Safety Awareness | 2 | 0 | 0 | 0.0 |
| **Total** | | | **23** | **6** | **6** | **24** |
| **Total Contact Hours = 35** | | | | | | |

CPE-252, CPE-253, and CPE-256 are practical papers only. There will not be any theory examination for these papers.

* * In addition to above mentioned subjects, there will be an additional course on Punjabi and Environment and Road Safety Awareness as qualifying subjects.

## Department of Computer Science & Engineering

Punjabi University, Patiala.

## General Instructions to the Paper Setters

(Common for B.Tech. in Computer Science & Engineering, Electronics and Communication Engineering, Mechanical Engineering, Civil Engineering and Integrated B.Tech/MBA Branches)

**Pattern of Question Paper**

TITLE OF SUBJECT (CODE----)

Bachelor of Technology (Branch) Section: ……..

End Semester Exam

TIME ALLOWED: 3 Hour Roll. No…….

Maximum Marks: 50

Pass Marks : 20

Note:- Section C is compulsory. Attempt any six questions selection three questions from each section A & B.

**Section-A (From Section A of the syllabus)**

Q1. .....

Q2. .....

Q3. .....

Q4. ..... 3x5

Q5……..

**Section-B (From Section B of the syllabus)**

Q6. .....

Q7. .....

Q8. .....

Q9. ..... 3x5

Q10…….

**Section-C (From whole syllabus)**

Q11

a).....

b).....

c).....

d).....

e).....

f).....

g).....

h).....

i).....

j)……. 10x2=20

***Note for the paper setter:***

1. Total numbers of questions to be set are Eleven (11) as per the above format.
2. There will be five questions in each of the Sections A and B. Each question will be of five (05) marks. However, a question may be segregated into subparts. Candidates will be required to attempt SIX questions by selecting three Questions from each Sections A & B.
3. Section C is compulsory and contains ten (10) sub-parts each of two (2) marks.
4. The maximum limit on numerical problems to be set in the paper is 35%.
5. The paper setter shall provide detailed marking instructions and solutions to numerical problems for evaluation purpose in the separate white envelopes provided for solutions.
6. The paper setters should seal the internal & external envelope properly with signatures & cello tape at proper place.
7. Log tables, charts, graphs, Design data tables etc. should be specified, whenever needed.
8. Use of Scientific calculator should be clearly specified.

**CPE-201 COMPUTER SYSTEM ARCHITECTURE**

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 0 | 3.5 |

**Maximum Marks(Internal):50** **Maximum Marks(External):50**

**Minimum Pass Marks(External):40%**

**Course Objectives:**

- To have a thorough understanding of the basic structure and operation of a digital computer.
- To discuss in detail the operation of the arithmetic unit including the algorithms & implementation of fixed-point and floating-point addition, subtraction, multiplication & division.
- To study the different ways of communicating with I/O devices and standard I/O interfaces.
- To study the hierarchical memory system including cache memories and virtual memory

**SECTION-A**

Introduction: Architecture and Organization, Structure and functions, Evolution of computer architecture, Performance parameters: Clock Rate, CPI, MIPS rate and Throughput.

Register transfer Language, Register transfer, Bus & memory transfer, arithmetic micro operations, Logic micro operations, Shift micro operation.

Basic Computer Organization and Design: Computer Register organization, types of registers, Computer Instructions: Instruction format, Types of instructions, Instruction set completeness. Instruction cycle, Interrupt Cycle, Design of basic computer, addressing modes.

Controller Design: Introduction to Hardwired control design. Micro program Control organization: Micro operation, Microinstruction Formats, Control Memory, Address Sequencing, Micro program Sequences.

**SECTION-B**

Arithmetic Unit: Integer representation: sign magnitude, 2's complement and fixed point representations, Integer Arithmetic, Addition, Subtraction, Multiplication Algorithm

Memory Organization: Memory Hierarchy, Main Memory(RAM and ROM), Memory - CPU interaction, Principle of locality (Temporal and Spatial) Cache Memory, Cache Organization (Direct, Fully Associative, Set Associative)

Input-Output Organization: I/O interfaces and Buses, I/O operations, Program driven Input-Output, Interrupt driven Input-Output, DMA and I/O processors.

Pipeline Processing: Introduction to Parallel Processing, Types of Pipelining: Arithmetic, Instruction and RISC Pipeline, Hazards in pipeline (Data, Control, Structural)

**Recommended Books:**

1. Computer System Architecture: M.M. Mano, Prentice Hall of India.
2. William Stallings, "Computer Organization and Architecture – Designing for Performance", 6th Edition, Pearson Education, 2003.
3 .Structured Computer Organization: Andrew S. Tanenbaum, Prentice Hall of India
4 .J.P. Hayes, Computer System Architecture, Prentice Hall of India, New Delhi.

**CPE-202 PYTHON PROGRAMMING**

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 0 | 3.5 |

**Maximum Marks(Internal):50** **Maximum Marks(External):50**

**Minimum Pass Marks(External):40%**

**Course Objectives:**

- Develop a basic understanding of the Python programming language.
- Learn various object types.
- Learn Numpy module for scientific computing.
- Learn to work with various type of data and convert it into meaningful information.
- Learn to visualize the data.

## SECTION – A

**Introduction to Python:**Python features, Type basics (Integer numbers, Complex numbers, Boolean numbers), Functions (Basic functions, local variables, global variables, variable scope, lambda functions),Loops, Flow Control Structures, Shared references, classes & objects.

**Object types:** Lists(Basic list operations, List iteration and comprehension, indexing, slicing, matrices), Dictionaries (Basic dictionary operations), Tuples (Basic tuple operations).

**NumPybasics:** Arithmetic with Numpy Arrays,Reshaping Arrays, Indexing, Slicing, Vectors and Matrices, Solving a Linear System.

## SECTION – B

**Pandas:**Creating Series objects,Series atrributes(index, values,dtype, isunique, ndim, shape, size),Series methods (sort_values, sort_index, count, describe, idxmax,idxmin,value_counts, head, tail), inplace parameter,DataFrame, Read data from csv file,Extracting columns from dataframe,Dataframe methods (sort_values, sort_index, astype, loc and iloc), Delete rows and columns from a dataframe, Broadcasting, Handling values (Null, Missing, Duplicate and Categorical), import excel file into pandas.

**Visualization:** UsingMatplotlib package, Creating Figures and Subplots, Creating charts (Line Chart, Scatter Chart, Bar chart, Pie chart, Box plot), Labels, Titles, Legends.

**Recommended Books**

1. Mark Lutz, “Learning Python”, 5th edition, O’Reilly.
2. Zed Shaw, “Learn Python the hard way”, 3rd edition, Pearson.
3. Eli Bresseert, “Scipy and Numpy”, O’Reilly.
4. William Mckinney, “Python for Data Analysis: Data wrangling with Pandas, NumPy, and Ipython”, 2nd edition, O’Reilly.
5. Phuong Vo.T.H, “Python: Data Analytics and Visualization”, Packt.

**CPE -203 DATA STRUCTURES**

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 0 | 3.5 |

**Maximum Marks(Internal):50** **Maximum Marks(External):50**

**Minimum Pass Marks(External):40%**

**Course Objectives:**

- To impart the basic concepts of data structures and algorithms
- To understand concepts about searching and sorting techniques
- To Understand basic concepts about stacks, queues, lists, trees and graphs
- To understanding about writing algorithms and step by step approach in solving problems with the help of fundamental data structures

**SECTION-A**

**Basic Data Structures and Operations on them:** Arrays, Stacks and Queues and Their Applications, Linked and Sequential Representation. Linked List, Representation of Linked List, Multi-Linked Structures

**Searching and Sorting**: use of Various Data Structures for Searching and Sorting, Linear and Binary Search, Bubble Sort, Insertion Sort, Shell Sort, Selection Sort. Merge Sort, Radix Sort, Quick Sort.

**Hashing:** Introduction to hash table, hash function, resolving collision by chaining and open addressing, deleting items from a hash table.

**SECTION-B**

**Trees:** Definitions and Basic Concepts, Linked Tree Representation, Representations in Contiguous Storage, Binary Trees, Binary Tree Traversal, Searching, Insertion and Deletion in Binary Trees, Binary Search Tree, Heap and Heap Sort Algorithm, AVL Trees.

**Graphs** and Their Application, Sequential and Linked Representation of Graph-Adjacency Matrix, Operations on Graph, Traversing a Graph, Dijkstra's Algorithm for Shortest Distance, DFS and BFS, Minimal Spanning Tree.

**File Organization:** Sequential, Relative, Index Sequential.

**Recommended Books:**

1. Data structures: a Pseudocode Approach with-C, IInd Edition,' Cengage Learning (Thomson).
2. Fundamentals of Data Structures, CBS Publishers and Distributors, Delhi, Ellis HorwitZ and Sartaj Sahni.
3. An introduction to data structures with applications, Mc-Graw Hill Inc., J.P. Trembley and P.G, Sorensen.
4. Data Structures and Program Design in C Prentice Hall of India, 1992, Robort L. Kruse, Bruce P. Leung, Cluvis L. Tundo.
5. Data Structure using (C & C++, Sanjeev Kumar, Khanna Publishers.
6. A Simplified Approach to Data Structures, Shroff Publications,Vishal Goyal, Lalit Goyal and Pawan Kumar.

**CPE-204 COMPUTER NETWORKS**

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 0 | 3.5 |

**Maximum Marks(Internal):50** **Maximum Marks(External):50**

**Minimum Pass Marks(External):40%**

**Course Objectives**

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

- Build an understanding of the fundamental concepts of computer networking.
- Familiarize the student with the basic taxonomy and terminology of the computer networking area.
- Introduce the student to advanced networking concepts, preparing the student for entry Advanced courses in computer networking.
- Allow the student to gain expertise in some specific areas of networking such as the design and maintenance of individual networks.

**SECTION-A**

**Introduction**, history and development of computer networks, Types of computer networks: LAN, MAN, WAN, broadcast and point to point networks, Network topologies,

**Layered Architecture:** concept of layers, protocols, interfaces and services, The OSI Reference Model, The TCP/IP Reference Model, Comparison of OSI and TCP/IP Models

**Physical Layer:** Concept of Analog & Digital Signal, Bandwidth, Transmission Impairments: Attenuation, Distortion, Noise, Data rate limits: Nyquist formula, Shannon Formula, Switching: Circuit Switching, Message Switching and Packet Switching, Comparison of Repeaters, Hubs, Switches.

**Transmission media:** Twisted Pair, Co-axial Cables, Fiber Optics, Wireless Transmission: Radio and Microwave and Infrared Transmission

**SECTION-B**

**Data Link Layer:** Data link layer Design Issues, Error Detection and Correction, Elementary data link protocols: An Unrestricted Simplex Protocol, A Simplex Stop and Wait Protocol, A Simplex Protocol for a Noisy Channel. Sliding window protocols: A One Bit Sliding Window Protocol, A Protocol Using go back N, A Protocol using Selective Repeat, CSMA CSMA/CD Protocols

**Network layer:** IP Addressing, IPV4 header, Fragmentation, Routing algorithms:-Shortest Path Routing, Flooding, Distance Vector Routing and Link State Routing, Introduction to Congestion, Congestion Control.

**Transport layer:** Introduction to Elements of Transport Protocols UDP, TCP

**Application layer:** Electronic-mail, WWW, Domain Name System, SMTP, HTTP.

**Recommended Books:**

1. A. S. Tannenbaum. Computer Networks, 3rd Edition, Prentice-Hall.
2. D. E. Comer. Internetworking with TCP-IP: Principles, Protocols and Architecture, Vol I, 2nd Edition, Prentice Hall, 1991.
3. D. E. Comer and D. L. Stevens. Internetworking with TCP-IP: Design, Implementation, and Internals, Vol II, Prentice Hall, 1990.

**CPE-205 DISCRETE MATHEMATICAL STRUCTURES**

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 0 | 3.5 |

**Maximum Marks(Internal):50** **Maximum Marks(External):50**

**Minimum Pass Marks(External):40%**

**Course Objectives**

Students will be able to:

- Write an argument using logical notation and determine if the argument is or is not valid.
- Demonstrate the ability to write and evaluate a proof or outline the basic structure
- Understand the basic principles of sets and operations in sets.
- Prove basic set equalities.
- Demonstrate different traversal methods for trees and graphs.
- Model problems in Computer Science using graphs and trees.

**SECTION-A**

**Relations and Functions:** Binary relations, composition of relations; Equivalence relations and partitions; partially ordered sets and Lattice Hasse diagrams; Functions, Injection, Surjection and Bisection; Composition of functions. Recursion and Recurrence Relations: Polynomials and their evaluation, recursion, iteration, sequences and discrete functions, Recurrence Relations, generating functions.

**Graphs:** Introduction to graphs, Graph terminology, Representing Graphs and Graph Isomorphism, Connectivity. Mathematical Logic: Statement and notations, normal forms, theory and inference for statement and calculus, predicate calculus, inference theory for predicate calculus. Graph Theory: Directed and undirected graphs and their matrix representations: Euclidean paths and cycles; Hamiltonian paths and cycles; shortest paths, Euler.'s formula.

**SECTION-B**

**Boolean Algebra:** Basic Circuits and theorems, Boolean expressions; Logic gates and relation of Boolean functions. Induction and Recursion: Principle of Mathematical induction; Recursive definition.

**Algebraic Structures:** Introduction to algebraic structures, semi groups; Groups and subgroups; Homomorphism and homomorphism of groups, Lagrange theorem.

**Recommended Books:**

1. J.P.Tremble: Discrete Mathematics Structure with application to Computer Science, McGraw Hill, 1987
2. Truss, Johan.K: Discrete Mathematics for Computer Scientist, Pearson Education, India.
3. Liu, C.L.: Elements of Discrete Mathematics, 4lh Edition, McGraw Hill, New York, 1998.

**CPE-206 DATABASE MANAGEMENT SYSTEM**

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 0 | 3.5 |

**Maximum Marks(Internal):50** **Maximum Marks(External):50**

**Minimum Pass Marks(External):40%**

**Course Objectives:**

- To understand the different issues involved in the design and implementation of a database system.
- To study the physical and logical database designs, database modeling, relational, hierarchical, and network models
- To understand and use data manipulation language to query, update, and manage a database
- To develop an understanding of essential DBMS concepts such as: database security, integrity, concurrency
- To design and build a simple database system and demonstrate competence with the fundamental tasks involved with modeling, designing, and implementing a DBMS

**SECTION-A**

**Introduction to Database Concepts:** Difference between Database and non database system, Data independence, DBMS Architecture, components of a database system, Advantages and disadvantages of Database system, Intended Uses of a DBMS, Schemas, and Instances, Database Languages and Interfaces.

**Data Models:** Relational Model, Network Model, Hierarchical Model, ER Model: Design, issues, Mapping constraints, keys, ER diagram, weak entity sets, extended ER features, Design of an ER Database schema, Reduction of an ER Schema to tables, Comparison of Models.

**Query Processing:** in Relation Algebra: Fundamental and Additional Relational Algebra operators. Relational Calculus: Tuple and Domain Relational Calculus.

**Relational Query Languages:** SQL: Basic SQL Select Statements. Table Creation and Management: Create, Alter, Drop and Rename. Constraints: Primary key, Foreign key, Unique, Not null and Check. Data Manipulation: Insert, Update and Delete. Restricting rows in Select using Where clause, Comparison operators, Logical Operators, Order by clause.

**SECTION-B**

**Database Design: Integrity Constraints:** Domain constraints, Referential integrity, entity integrity, specify these constraints in SQL, specification of Additional Constraints as assertions and triggers.

**Functional dependencies:** Functional dependencies, Decomposition, Normalization using FD's MVD's and JD's Domain key normal form.

**Query Optimization**: Translating SQL Queries into Relational Algebra, Notation for Query Trees and Query Graphs, Heuristic Optimization of Query Trees, Transformation Rules for Relational Algebra Operations, Heuristic Algebraic Optimization Algorithm, Converting Query Trees into Query Execution Plans. Cost Components in Query Optimization, Using cost estimates in query optimization.

**Joining Data from Multiple Tables:** Equi, Non-Equal, Self and Outer Joins. Single-row and Group functions. Sub-queries. Introduction to Oracle Server and Data Dictionary. Additional Database Object: Sequences, Synonyms and Views.

**Recommended Books:**

1. Navathe and Elmasri, Fundamentals of Database Systems, Pearson education
2. Korth and Silberschatz Abraham, Database Concepts, McGraw Hall, 1991.
3. An introduction to database system by C.J.Date (Addison Welsey, Publishing house).
4. Bipin Desai, Database System, TMG
5. Prateek Bhatia, Database Management system, Kalayani Publishers

**CPE -252 PYTHON PROGRAMMING LAB**

| L | T | P | Cr |
|---|---|---|---|
| 0 | 0 | 2 | 1.0 |

**Total Marks:100**

**LIST OF PRACTICALS**

1. Write a program to calculate the average of numbers in a given List.
2. Write a program to remove duplicate items from the List.
3. Write a program to sum all the items in a dictionary.
4. Write a program to create a function that finds the product of List elements. Also do the same operation using lambda functions.
5. Write a program to create a numpy array and retrieve the value from it using array index and slicing. Also reshape the 1-D array into 2-D array.
6. Write a program to extract data from a csv and excel file.
7. Write a program to select columns and rows from a dataframe.
8. Write a program to handle missing data in a dataframe using pandas library.
9. Write a program to plot a scatter graph for the data contained in two lists.
10. Write a program to create various charts for the given data.

**CPE-253 DATA STRUCUTRES LAB**

| L | T | P | Cr |
|---|---|---|---|
| 0 | 0 | 2 | 1.0 |

**Total Marks:100**

**LIST OF PRACTICALS**

1. Write a program to check whether a string is palindrome or not

2. Write a program to extract substring from given string.

3. Write a program to implement stack using arrays.

4. Write a program to implement queues using arrays.

5. Write a program to sort a given list of number using following algorithm.
   1. Bubble sort
   2. Insertion sort
   3. Selection sort
   4. Quick sort
   5. Radix sort

6. Write a program to implement linear and binary search algorithm.

7. Write a program to create a linked list and perform following operations:
   1) Insert element at beginning.
   2) Insert element at end.
   3) Insert element at given position.
   4) Delete element from beginning
   5) Delete element at end.
   6) Delete element from given position.

8. Take a list of number and create a sorted linked list from given list

9. Implement stack using linked representation.

10. Implement queue using linked representation.

**CPE-256 DATABASE MANAGEMENT SYSTEM LAB**

| L | T | P | Cr |
|---|---|---|---|
| 0 | 0 | 2 | 1.0 |

**Total Marks:100**

**LIST OF PRACTICALS**

The students are required to do exercises / projects in database design like:

1. Creation of tables, virtual tables and views in SQL,
2. Viewing the contents of data dictionary
3. Changing of schema
4. Insert, update, delete of rows tables in SQL
5. Specification of various constraints in SQL: Integrity Constraints: Domain constraints, Referential integrity, entity integrity etc
6. Specification of Additional Constraints as assertions and triggers
7. Query processing in SQL

ਪੰਜਾਬੀ ਲਾਜ਼ਮੀ (ਮੁੱਢਲਾ ਗਿਆਨ)

ਅੰਡਰ ਗ੍ਰੈਜੂਏਟ ਪੱਧਰ ਤੇ ਪ੍ਰੋਫੈਸ਼ਨਲ ਕੋਰਸਾਂ ਲਈ ਕੁਆਲੀਫਾਇੰਗ ਪੰਜਾਬੀ (ਬੈਚ 2014 ਤੋ ਲਾਗੂ)

| L | T | P | Cr |
|---|---|---|---|
| 3 | 0 | 0 | 0.0 |

For Other State Students of
B. Tech & 6 Yr. Engineering Management Integrated Program Only

ਕੁੱਲ ਅੰਕ: 100 (ਮੌਖਿਕ ਪ੍ਰੀਖਿਆਂ 40 ਅੰਕ; ਬਾਹਰੀ ਪ੍ਰੀਖਿਆਂ 60 ਅੰਕ) ਪਾਸ ਅੰਕ 35

ਸਮਾਂ : 3 ਘੰਟੇ ਪੀਰੀਅਡ: 3 ਪ੍ਰਤੀ ਹਫ਼ਤਾ

ਭਾਗ ੳ

1) ਗੁਰਮੁਖੀ ਵਰਣਮਾਲਾ ਤੇ ਲੇਖਣ ਪ੍ਰਬੰਧ

ੳ) ਅੱਖਰ ਸਿੱਖਿਆ: ਤਰਤੀਬਵਾਰ ਤੇ ਭੁਲਾਵੇਂ ਅੱਖਰ

ਅ) ਅੱਖਰ ਬਣਤਰ: ਅੱਖਰ ਰੂਪ ਤੇ ਲਿਖਣ ਦੇ ਨਿਯਮ

2) ਗੁਰਮੁਖੀ ਅੱਖਰ ਤੇ ਪੰਜਾਬੀ ਧੁਨੀਆਂ ਦਾ ਪ੍ਰਬੰਧ

ੳ) ਸਵਰ ਤੇ ਵਿਅੰਜਨ: ਵਰਗੀਕਰਨ ਦੇ ਸਿਧਾਂਤ ਤੇ ਉਚਾਰਨ

ਅ) ਲਗਾਂਮਾਤਰਾਂ ਦੀ ਪਛਾਣ ਤੇ ਵਰਤੋ

ਭਾਗ ਅ

1) ਲਿਪੀ ਦੇ ਅੱਖਰਾ ਦੀ ਵਰਤੋ ਦੇ ਨਿਯਮ

ੳ) ਪੂਰੇ ਤੇ ਅੱਧੇ ਅੱਖਰ ਦੀ ਪਛਾਣ ਤੇ ਵਰਤੋ

ਅ) ਸਵਰ ਸੂਚਕ ਅੱਖਰਾ ਦੀ ਪਛਾਣ ਤੇ ਵਰਤੋ

2) ਪੰਜਾਬੀ ਸ਼ਬਦਾਵਲੀ ਨਾਲ ਜਾਣਪਛਾਣ।

ੳ) ਹਫ਼ਤੇ ਦੇ ਦਿਨ

ਅ) ਮਹੀਨਿਆ ਦੇ ਨਾਮ

ੲ) ਰੰਗਾ ਦੇ ਨਾਮ

ਸ) ਪੰਜਾਬੀ ਰਿਸਤਾਨਾਤਾ ਪ੍ਰਬੰਧ ਸ਼ਬਦਾਵਲੀ

ਭਾਗ ੲ

1) ਸ਼ਬਦ ਪ੍ਰਬੰਧ: ਸਬਦ ਜੋੜਾ ਦੀ ਵਰਤੋ

ੳ) ਦੋ ਅੱਖਰੀ ਸ਼ਬਦਾ ਦੇ ਸ਼ਬਦਜੋੜ

ਅ) ਤਿੰਨ ਅੱਖਰੀ ਸ਼ਬਦਾ ਦੇ ਸ਼ਬਦ ਜੋੜ

2) ਸ਼ਬਦਾਂ ਦੀਆ ਸ਼੍ਰੇਣੀਆਂ ਤੇ ਵਿਆਕਰਨਕ ਵਰਗਾ ਦੀ ਪਛਾਣ

ੳ) ਸ਼ਬਦਾ ਦੀਆ ਸ਼੍ਰੇਣੀਆਂ ਦਾ ਸਿਧਾਂਤ, ਪਛਾਣ ਤੇ ਵਰਤੋ, (ਨਾਵ, ਪੜਨਾਵ, ਵਿਸ਼ੇਸਣ, ਕਿਰਿਆ ਵਿਸ਼ੇਸਣ ਆਦਿ)

ਭਾਗ ਸ

1) ਸ਼ਬਦ ਬਣਤਰਾਂ ਤੇ ਵਿਆਕਰਨਕ ਇਕਾਈਆ ਦਾ ਸਿਧਾਂਤ ਤੇ ਵਰਤੋ

ੳ) ਪੰਜਾਬੀ ਸ਼ਬਦ ਬਣਤਰਾ ਦਾ ਸਿਧਾਂਤ, ਪਛਾਣ ਤੇ ਵਰਤੋ
(ਅਗੇਤਰ, ਪਿਛੇਤਰ, ਸਮਾਸ, ਦੁਹਰੁਕਤੀ)

ਅ) ਵਿਆਕਰਨਕ ਇਕਾਈਆ ਦਾ ਸਿਧਾਂਤ, ਪਛਾਣ ਤੇ ਵਰਤੋ (ਵਾਕਅੰਸ਼, ਉਪਵਾਕ ਤੇ ਵਾਕ)

ਅੰਡਰ ਗ੍ਰੈਜੂਏਟ ਪੱਧਰ ਤੇ ਪ੍ਰੋਫੈਸ਼ਨਲ ਕੋਰਸਾਂ ਲਈ ਕੁਆਲੀਫਾਇੰਗ ਪੰਜਾਬੀ

ਸਿਲੇਬਸ

ਕੁਲ ਸਮਾਂ:100 ਲਿਖਤੀ:60 ਅੰਕ

ਸਮਾਂ:3 ਘੰਟੇ ਮੌਖਿਕ ਪ੍ਰੀਖਿਆ:40 ਅੰਕ

ਪੀਰੀਅਡ: 3 ਪ੍ਰਤੀ ਹਫਤਾ ਪਾਸ ਅੰਕ:35%

1. ਪੰਜਾਬੀ ਦੀ ਪਾਠਪੁਸਤਕ

(ਮੁੱਖ ਸੰਪਾਦਕ: ਬਲਦੇਵ ਸਿੰਘ ਚੀਮਾ, ਪ੍ਰਕਾਸ਼ਕ ਪਬਲੀਕੇਸ਼ਨ ਬਿਊਰੋ, ਪੰਜਾਬੀ ਯੂਨੀਵਰਸਿਟੀ, ਪਟਿਆਲਾ)

ਭਾਗ ਪਹਿਲਾ ਪੰਜਾਬੀ ਸਾਹਿਤ

(ੳ) ਕਵਿਤਾ

(ਅ) ਕਹਾਣੀ

(ੲ) ਨਾਟਕ

ਭਾਗ ਦੂਜਾ ਪੰਜਾਬ ਸਭਿਆਚਾਰ ਅਤੇ ਲੋਕਧਾਰਾ

ਭਾਗ ਤੀਜਾ ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਤੇ ਗੁਰਮੁਖੀ ਲਿਪੀ

ਅੰਕ ਵੰਡ ਅਤੇ ਪੇਪਰ ਸੈਟਰ ਲਈ ਹਦਾਇਤਾਂ

ਪੁਸਤਕ ਦੇ ਤਿੰਨ ਭਾਗ ਹਨ। ਪ੍ਰੰਤੂ ਪ੍ਰਸ਼ਨ ਪੱਤਰ ਦੋ ਭਾਗਾਂ ਵਿਚ ਹੋਵੇਗਾ। ਪ੍ਰਸ਼ਨ ਪੱਤਰ ਦਾ ਪਹਿਲਾ ਭਾਗ ਪੁਸਤਕ ਦੇ ਪਹਿਲੇ ਭਾਗ ਉਤੇ ਆਧਾਰਿਤ ਹੋਵੇਗਾ। ਇਸ ਭਾਗ ਦੇ ਕੁਲ 36 ਅੰਕ ਹਨ। ਪ੍ਰਸ਼ਨ ਪੱਤਰ ਦਾ ਦੂਜਾ ਭਾਗ ਪੁਸਤਕ ਦੇ ਦੂਜੇ ਅਤੇ ਤੀਜੇ ਭਾਗ ਉਤੇ ਅਧਾਰਿਤ ਹੋ◌ੇਵੇਗਾ। ਇਸ ਭਾਗ ਦੇ ਕੁਲ 24 ਅੰਕ ਹੋਣਗੇ ਅਤੇ ਇਸ ਵਿਚ ਪੁਸਤਕ ਦੇ ਦੂਜੇ ਅਤੇ ਤੀਜੇ ਭਾਗ ਦੇ 1212 ਅੰਕ ਹੋਣਗੇ।

(1) ਪੁਸਤਕ ਦੇ ਪਹਿਲੇ ਭਾਗ ਦੇ ਤਿੰਨ ਉਪਭਾਗ ੳ, ਅ ਅਤੇ ੲ ਹਨ। ਇਨ੍ਹਾਂ ਤਿੰਨਾਂ ਉਪਭਾਗਾਂ ਵਿਚੋਂ ਹੇਠ ਅਨੁਸਾਰ ਸੁਆਲ ਪੁੱਛੇ ਜਾਣ।

(ੳ) ਇਸ ਵਿਚ ਕੁਲ 12 ਪ੍ਰਸ਼ਨ ਔਬਜੈਕਟਿਵ ਟਾਈਪ/ਮਲਟੀਪਲ ਚੋਣ ਵਾਲੇ ਹੋਣਗੇ। ਹਰ ਉਪਭਾਗ ਵਿੱਚੋਂ 4 ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣਗੇ। ਸਾਰੇ ਪ੍ਰਸ਼ਨ ਕਰਨੇ ਲਾਜ਼ਮੀ ਹੋਣਗੇ। ਅੰਕ 3 X 4 = 12

(ਅ) ਹਰ ਉਪ ਭਾਗ ਵਿਚੋਂ 5--5 ਲਘੂ ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣਗੇ ਜਿਨ੍ਹਾਂ ਵਿਚੋਂ ਹਰ ਭਾਗ ਵਿੱਚੋਂ 3 ਪ੍ਰਸ਼ਨ ਕਰਨੇ ਲਾਜ਼ਮੀ ਹੋਣਗੇ। ਉੱਤਰ ਪੰਜ ਲਾਈਨਾਂ ਤੋਂ ਵੱਧ ਨਾ ਹੋਵੇ। ਅੰਕ 9 X 2 = 18

(ੲ) ਹਰ ਉਪ ਭਾਗ ਵਿਚੋਂ 1 ਪ੍ਰਸ਼ਨ ਪੁਛਿਆ ਜਾਵੇਗਾ। ਇਨ੍ਹਾਂ ਵਿਚੋਂ ਕੋਈ ਇਕ ਪ੍ਰਸ਼ਨ ਹੱਲ ਕਰਨਾ ਹੋਵੇਗਾ। ਉੱਤਰ ਇਕ ਸਫੇ ਤੱਕ ਸੀਮਤ ਹੋਵੇ। ਅੰਕ = 06

(2) ਪੁਸਤਕ ਦੇ ਦੂਜੇ ਅਤੇ ਤੀਜੇ ਭਾਗ ਵਿਚੋਂ ਪ੍ਰਸ਼ਨ ਇਸ ਪ੍ਰਕਾਰ ਪੁੱਛੇ ਜਾਣਗੇ।

(ੳ) ਹਰ ਭਾਗ ਵਿਚੋਂ 4 ਪ੍ਰਸ਼ਨ ਔਬਜੈਕਟਿਵ ਟਾਈਪ/ਮਲਟੀਪਲ ਚੋਣ ਵਾਲੇ ਹੋਣਗੇ। ਸਾਰੇ ਪ੍ਰਸ਼ਨ ਕਰਨੇ ਲਾਜ਼ਮੀ ਹੋਣਗੇ।
ਅੰਕ 4+4 = 8

(ਅ) ਹਰ ਇਕ ਭਾਗ ਵਿਚ 4 ਸੰਖੇਪ ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣਗੇ। 8 ਪ੍ਰਸ਼ਨਾਂ ਵਿੱਚੋਂ ਕੁਲ 5 ਪ੍ਰਸ਼ਨ ਹੱਲ ਕਰਨੇ ਹੋਣਗੇ। ਹਰ ਭਾਗ ਵਿਚੋਂ 2 ਪ੍ਰਸ਼ਨ ਲਾਜ਼ਮੀ ਹਨ। ਅੰਕ 5 X 2 = 10

(ੲ) ਹਰ ਇਕ ਭਾਗ ਵਿਚੋਂ 1 ਪ੍ਰਸ਼ਨ ਪੁਛਿਆ ਜਾਵੇਗਾ। ਇਨ੍ਹਾਂ ਵਿਚੋਂ ਕੋਈ ਇਕ ਪ੍ਰਸ਼ਨ ਹੱਲ ਕਰਨਾ ਹੋਵੇਗਾ। ਉੱਤਰ ਇਕ ਸਫ਼ੇ ਤੱਕ ਸੀਮਤ ਹੋਵੇ। ਅੰਕ = 06

ਨੋਟ: ਮੌਖਿਕ ਪ੍ਰੀਖਿਆ ਪਾਠਪੁਸਤਕ ਤੇ ਹੀ ਅਧਾਰਿਤ ਹੋਵੇਗੀ। ਇਸ ਦੀ ਵਿਧੀ ਪ੍ਰੈਕਟੀਕਲ ਵਾਲੀ ਹੋਵੇਗੀ।

## ENVIRONMENT & ROAD SAFETY AWARENESS

| L | T | P | Cr |
|---|---|---|---|
| 2 | 0 | 0 | 0.0 |

**Maximum Marks(Internal):40** **Maximum Marks(External):60**

Internal Assessment: 15
(5 for Attendance & 10 for MST)
Mandatory field visit to PG
Science City & Report: 25 Marks

### INSTRUCTIONS FOR THE PAPER SETTERS (Regular Students)

The question paper will consist of three sections A, B and C. Each of sections A and B will have four questions from the respective sections of the syllabus. Each question shall carry 9 marks. Section C will consist of 12 short answer type questions of 2 marks each.

### INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt any two questions from each section A and B. Section C is compulsory.

### SECTION-A

**INTRODUCTION TO ENVIRONMENTAL STUDIES:**
The multidisciplinary nature of environmental studies. Definition, scope and importance
Concept of Biosphere – Lithosphere, Hydrosphere, Atmosphere.

**ECOSYSTEM & BIODIVERSITY CONSERVATION**
Ecosystem and its components, Types of Ecosystems
Biodiversity - Definition and Value, Threats to biodiversity and its conservation
Level of biological diversity: genetic, species and ecosystem diversity; bio-geographic zones of India; biodiversity patterns and global biodiversity hot spots.
India as Mega-biodiversity nation; Endangered and endemic species of India.
Ecosystem and biodiversity services: Ecological, economic, social, ethical, aesthetic and informational value.

**NATURAL RESOURCES–RENEWABLE AND NON RENEWABLE RESOURCES**
Land resources and land use change; land degradation, soil erosion and desertification.
Deforestation: causes and impacts due to mining, dam building on environment, Forests, Biodiversity and tribal populations.
Water: Use and over-exploitation of surface and ground water, Floods, droughts, conflicts over water (international & inter-state)
Energy resources: renewable and non renewable energy sources, use of alternate energy sources, growing energy needs, case studies.

**Environmental Pollution**
Environmental Pollution : types, causes, effects and controls; Air, Water, Soil and noise pollution. Nuclear hazards and human health risks Solid waste management, Source Segregations : Control measures of urban and Industrial waste. Pollution case studies.

### SECTION-B

**ENVIRONMENTAL PROTECTION LAWS IN INDIA**
Environmental protection act for; Air (Prevention and control of pollution), Water (Prevention and Control of pollution), Wild life, Forest Conservation, Issues involved in the enforcement of environmental legislation.Role of an individual in prevention of pollution.
Environmental policies & Practices; Climate change, global warming, ozone layer depletion, acid rain and imapcts on human communities and agriculture.

**Human Communities and the Environment**

Human population growth: Impacts on environment, human health and welfare, Sanitation & Hygiene. Resettlement and rehabilitation of project affected persons; case studies. Disaster management: floods, earthquake, cyclones and landslides. Environment movements: Chipko, Silent valley, Bishnois of Rajasthan. Environmental ethics: Role of Indian and other religions and cultures in environmental conservation for a Clean-green pollution free state.
Environmental communication and public awareness, case studies (e.g., CNG vehicles in Delhi)

**ROAD SAFETY AWARENESS**

Concept and significance of Road safety, Traffic signs, Traffic rules, Traffic Offences and penalties, How to obtain license, Role of first aid in Road Safety.

**Stubble Burning**

Meaning of Stubble burning.
Impact on health & environment.
Management and alternative uses of crop stubble.
Environmental Legislations and Policies for Restriction of Agriculture Residue Burning in Punjab.

**Field Work**

Visit to an area to document environmental assets: river/Forest/Flora/Fauna, etc.
Visit to Local polluted site –urban/Rural/Industrial/Agricultural.
Study of common Plants, Insects, Birds and basic principles of identification.
Study of simple ecosystems-pond, river, Delhi Ridge, etc.

**Suggested Readings :**

1. Carson, R.2002. Silent Spring, Houghton Mifflin Harcourt.
2. Gadgil. M., & Guha,R.1993. This Fissured Land : An Ecological History of India. Univ. of California Press.
3. Gleeson, B. and Low, N.(eds.)1999. Global Ethics and Environment, London, Routledge.
4. Gleick,P.H.1993. Water in Crisis.Pacific Institute for Studies in Dev. Environment & Security. Stockholam Env. Institute, Oxford Univ. Press.
5. Groom, Martha J., Gary K. Meffe, and Carl Ronald Carroll. Principles of Conservation Biology. Sunderland : Sinauer Associates, 2006.
6. Grumbine, R. Edward, and Pandit, M.K. 2013. Threats from India's Himalays dams. Science,339:36-37.
7. McCully,P.1996. Rivers no more: the environmental effects of dams (pp.29-64). Zed Books.
8. McNeill, John R. 2000. Something New Under the Sun : An Environmental History of the Twentieth Century.
9. Odum, E.P., H.T & Andrews, J.1971. Fundamentals of Ecology. Philadelphia : Saunders.
10. Pepper, I.L., Gerba ,C.P & Brusseau, M.L. 2011. Environmental and Pollution Sciences. Academic Press.
11. Rao, M.N. & Datta, A.K.1987. Waste Water Treatment. Oxford and IBH Publishing Co. Pvt.Ltd.
12. Raven, P.H., Hassenzahl, D.M. & Berg, L.R.2012,Environment. 8Th edition. John Wiles & Sons.
13. Rosencranz, A., Divan, S., & Nobie, M.L. 2001. Environmental law and policy in India. Tripathi 1992
14. Sengupta, R. 2003. Ecology and economics: An approach to sustainable development. OUP.
15. Singh, J.S., Singh, S.P. and Gupta, S.R. 2014. Ecology, Environmental Science and Conservation. S. Chand Publishing, New Delhi.
16. Sodhi, N.S. Gibson, L. & Raven, P.H. (eds). 2013. Conservation Biology: Voices from the Tropics. John Wiley & Sons.
17. Thapar, V. 1998. Land of the Tiger: A Natural History of the Indian Subcontinent.
18. Warren, C.E. 1971. Biology and Water Pollution Control. WB Saunders.

**B. TECH SECOND YEAR**
**COMPUTER SCIENCE & ENGINEERING**

**(Batch 2020)**
**Session (2021-22)**

**SCHEME OF PAPERS**

**FOURTH SEMESTER (COMPUTER SCIENCE & ENGINEERING)**

| S.No. | Subject Code | Subject Name | L | T | P | Cr. |
|---|---|---|---|---|---|---|
| 1. | CPE-207 | Web Technologies | 3 | 1 | 0 | 3.5 |
| 2. | CPE-208 | Operating Systems | 3 | 1 | 0 | 3.5 |
| 3. | CPE-209 | Software Engineering | 3 | 1 | 0 | 3.5 |
| 4. | CPE-210 | Computer Graphics | 3 | 1 | 0 | 3.5 |
| 5. | CPE-212 | Microprocessor & Assembly Language Programming | 3 | 1 | 0 | 3.5 |
| 6. | | Elective-I* | 3 | 1 | 0 | 3.5 |
| 7. | CPE-257 | Web Technologies Lab | 0 | 0 | 2 | 1.0 |
| 8. | CPE-258 | Operating Systems Lab | 0 | 0 | 2 | 1.0 |
| 9. | CPE-260 | Computer Graphics Lab | 0 | 0 | 2 | 1.0 |
| 10. | CPE-262 | Microprocessor & Assembly Language Programming Lab | 0 | 0 | 2 | 1.0 |
| 11. | *** | Drug Abuse: Problem, Management And Prevention (Qualifying Course) | 2 | 0 | 0 | 0.0 |
| **Total** | | | **20** | **6** | **8** | **25** |
| **Total Contact Hours = 32** | | | | | | |

**ELECTIVE SUBJECTS – I***

| S. No. | Subject Code | Subject Name | L | T | P | Cr. |
|---|---|---|---|---|---|---|
| 1. | HSS-201 | Management Practice & Organization Behaviour | 3 | 1 | 0 | 3.5 |
| 2. | CPE-211 | Building Enterprise Applications | 3 | 1 | 0 | 3.5 |
| 3. | CPE-213 | Business Intelligence | 3 | 1 | 0 | 3.5 |
| 4. | MBA-5011 | Foundations of Financial Accounting | 3 | 1 | 0 | 3.5 |

***Choose any one from the list. Elective under Massive Open Online Courses (MOOCS) available on SWAYAM platform of Govt. of India offered through online mode. The subjects which students can opt from MOOCS will be notified by the department semester wise time to time**

CPE-257, CPE-258, CPE-260 and CPE-262 are practical papers only. There will not be any theory examination for these papers.

## Department of Computer Science & Engineering

Punjabi University, Patiala.

## General Instructions to the Paper Setters

(Common for B.Tech. in Computer Science & Engineering, Electronics and Communication Engineering, Mechanical Engineering, Civil Engineering and Integrated B.Tech/MBA Branches)

**Pattern of Question Paper**

TITLE OF SUBJECT (CODE----)

Bachelor of Technology (Branch) Section: ……..

End Semester Exam

TIME ALLOWED: 3 Hour Roll. No…….

Maximum Marks: 50

Pass Marks : 20

Note:- Section C is compulsory. Attempt any six questions selection three questions from each section A & B.

**Section-A (From Section A of the syllabus)**

Q1. .....

Q2. .....

Q3. .....

Q4. ..... 3x5

Q5……..

**Section-B (From Section B of the syllabus)**

Q6. .....

Q7. .....

Q8. .....

Q9. ..... 3x5

Q10…….

**Section-C (From whole syllabus)**

Q11

a).....

b).....

c).....

d).....

e).....

f).....

g).....

h).....

i).....

j)……. 10x2=20

***Note for the paper setter:***

1. Total numbers of questions to be set are Eleven (11) as per the above format.
2. There will be five questions in each of the Sections A and B. Each question will be of five (05) marks. However, a question may be segregated into subparts. Candidates will be required to attempt SIX questions by selecting three Questions from each Sections A & B.
3. Section C is compulsory and contains ten (10) sub-parts each of two (2) marks.
4. The maximum limit on numerical problems to be set in the paper is 35%.
5. The paper setter shall provide detailed marking instructions and solutions to numerical problems for evaluation purpose in the separate white envelopes provided for solutions.
6. The paper setters should seal the internal & external envelope properly with signatures & cello tape at proper place.
7. Log tables, charts, graphs, Design data tables etc. should be specified, whenever needed.
8. Use of Scientific calculator should be clearly specified.

**CPE-207 WEB TECHNOLOGIES**

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 0 | 3.5 |

**Maximum Marks(Internal):50** **Maximum Marks(External):50**

**Minimum Pass Marks(External):40%**

**Course Objective:**

- Students are able to develop a dynamic webpage by the use of java script and DHTML.
- Students will be able to write a well formed / valid XML document.
- Students will be able to write a server side java application.
- Students will be able to know of CSS, JQuery and AJAX

**SECTION-A**

**INTERNET AND WORLD WIDE WEB:** Introduction, Internet addressing, ISP, types of Internet connections, introduction to WWW, web browsers, web servers, URL, HTTP, DNS, web applications, tools for web site creation.

**HTML**: Introduction to HTML, lists, adding graphics to HTML page, creating tables, linking documents, frames, DHTML and cascading style sheets.

**XML:** Why XML, XML syntax rules, XML elements, XML attributes, XML DTD displaying XML with CSS.

**SECTION-B**

**PHP:** Introduction, syntax, variables, statements, operators, decision making, loops, arrays, strings, Error Handling , Try, catch, throw, forms, get and post methods, functions, cookies, sessions.

**PHP and MySQL:** Introduction to MySQL, connecting to MySQL database, creation, insertion, deletion and retrieval of MySQL data using PHP, PHP and XML, XML parsers, XML DOM.

**Recommended Books :**

1. Head First HTML with CSS & XHTML by Elisabeth Freeman and Eric Freeman
2. HTML5 for Web Designers by Jeremy Keith
3. HTML5 & CSS3 For The Real World by Alexis Goldstein, Estelle Weyl, and Louis Lazaris
4. The Essential Guide to CSS and HTML Web Design by Craig Grannell
5. The Truth About HTML5 by Luke Stevens and RJ Owen
6. XML black book by Natanya Pitts-Moultis
7. XML for Dummies by Ed Tittel and Lucinda Dykes
8. JavaScript & JQuery: The Missing Manual by David McFarland
9. Ajax: The Complete Reference by Thomas Powell

**CPE-208 OPERATING SYSTEMS**

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 0 | 3.5 |

**Maximum Marks(Internal):50** **Maximum Marks(External):50**

**Minimum Pass Marks(External):40%**

**Course objectives:**

- To learn the fundamentals of Operating Systems.
- To learn the mechanisms of OS to handle processes and threads and their communication
- To learn the mechanisms involved in memory management in contemporary OS
- To gain knowledge on distributed operating system concepts that includes architecture, Mutual exclusion algorithms, deadlock detection algorithms and agreement protocols
- To know the components and management aspects of concurrency management
- To learn programmatically to implement simple OS mechanisms

## SECTION-A

**Basic Functions and Concepts of Operating Systems:** Concept of an operating system, batch system, Multi-programmed, Time sharing, Personal Computer System, Parallel system, Real time system, Network Operating System and Distributed Operating System.

**Features and Objective of Operating Systems:** System components, operating system services, System calls, System Programmers, System Structure: Simple Structure, Layered Approach, Microkernel

**Process Management:** Concept of process, process states, process control block, Process Scheduling: Scheduling Queues, Schedulers, and Context Switch, operations on processes CPU scheduling Algorithms: FCFS, SJF, RR and priority, Multilevel queue scheduling, Multilevel feedback queue scheduling

**Deadlocks:** Introduction to deadlocks, Necessary Conditions for deadlock, Resource allocation graph, Deadlock Prevention, Deadlock Avoidance: Safe state, Resource-Allocation-Graph Algorithm, Banker's Algorithm, Deadlock Detection, Recovery from Deadlock

## SECTION-B

**Memory Management:** Logical and physical address space, Swapping, Contiguous memory Allocation: Memory Protection, Memory Allocation, Fragmentation, paging: basic method, Protection and shared pages, segmentation: basic method, hardware, Protection and sharing, virtual memory, Demand Paging, Page Replacement Algorithms ((FIFO, Optimal, LRU, LRU Approximation page replacement), Allocation of Frames, Thrashing.

**Information Management:** Files - file concept, file types, File attributes, file operations, access methods, allocation methods (contiguous, linked, indexed), directory structure free-space management (bit vector, linked list, grouping, counting),

**Disk Management:** Disk structure, Disk Scheduling (FCFS, SSTF, SCAN, C-SCAN, LOOK), Disk Management (Disk Formatting, Boot Block, Bad Blocks), Swap Space Management: Swap Space Use, Swap Space Location.

**Case Studies:** Brief introduction of Windows, UNIX and LINUX.

**Recommended Books:**

1. Operating System: (Sixth Edition) 2005: Galvin Silberschatz, Addison Wesley Publishing Ltd.
2. Flynn "Understanding operating Systems", Cengage Learning (Thomson)
3. DM Dhamdhere, "Operating System r A Concept Based Approach", Tata Me Graw- Hill.
4. Operating Systems Design and Implementation: Andrew S. Tanembaum, PHI (Latest Edition).

**CPE-209 SOFTWARE ENGINEERING**

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 0 | 3.5 |

**Maximum Marks(Internal):50** **Maximum Marks(External):50**

**Minimum Pass Marks(External):40%**

**Course Objectives**

- The program will prepare our students to be successful professionals in the field with solid fundamental knowledge of software engineering.
- Be successful professionals in the field with solid fundamental knowledge of software engineering
- Utilize and exhibit strong communication and interpersonal skills, as well as professional and ethical principles when functioning as members and leaders of multi-disciplinary teams
- Apply their foundations in software engineering to adapt to readily changing environments using the appropriate theory, principles and processes

**SECTION-A**

**Introduction to Software Engineering:** Software Problem, Software Engineering, Approach, Software process, Characteristics of Software Engineering Process, software Development models.

**Software Requirement Analysis and Specification:** Software Requirement Specification, Problem Analysis, Requirement Specifications.

**Software Project Planning:** Cost estimation, cost estimation models, Project scheduling, Software Configuration management, Team Structure, Risk Management.

**SECTION-B**

**Function oriented design:** Design principles, Coupling Cohesion, Structured Design Methodologies

**Object Oriented Design:** OOAD, Classes and objects, inheritance and polymorphism, design notation and specification

Brief introduction to various standards related to Software Engineering

**Coding:** Top Down, bottom up approaches, structured programming, information hiding programming style, documentation,

**Testing:** Testing Fundamentals, White box testing, Black box testing, Functional testing, boundary value testing, cause effect, graphing.

**Recommended Books:**

1. Software Engineering Approach, By R. S Pressman
2. Software Engineering, SOMMERVILLE Pearson Education
3. An Integrated Approach to software Engineering. PANKAJ JALOTE

**CPE-210 COMPUTER GRAPHICS**

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 0 | 3.5 |

**Maximum Marks(Internal):50** **Maximum Marks(External):50**

**Minimum Pass Marks(External):40%**

**Course objectives:**

- To provide comprehensive introduction about computer graphics system, design algorithms and two dimensional transformations.
- To make the students familiar with techniques of clipping, three dimensional graphics and three dimensional transformations.
- The computer graphics course prepares students for activities involving in design, development and testing of modeling, rendering, shading and animation.

**SECTION-A**

**Graphics Hardware:** Raster CRTs, Raster and Random Scan Displays, Display Controllers and Processors, Graphics Input Devices, Applications of Computer Graphics.

**Raster Scan Conversion Algorithms:** Line Drawing Algorithms (DDA & Bresenham's), Circle Drawing Algorithms (Mid Point and Bresenham's).

**Two-Dimensional Geometric Transformations:** Basic Transformations, (Translation, Rotation and Scaling) Matrix Representation and Homogenous Coordinates, Shear and Reflection Transformations, Composite Transformations.

**Filling:** Region filling Algorithms (Boundary Fill and Flood Fill).

**SECTION-B**

**Windowing And Clipping:** Viewing pipeline, viewing transformations. 2-D Clipping algorithms-Line clipping algorithms (Cohen Sutherland, Liang Barsky algorithm) Polygon clipping (Sutherland Hodgeman polygon clipping, Weiler and Atherton polygon clipping).

**Three-Dimensional Geometric Transformations:** Basic Transformations: (Translation, Scaling, Rotation) Composite transformations.

**Projections:** Parallel and Perspective.

**Visible Surface Detection Methods:** Depth Buffer Method, A-Buffer Method, Scan Line Method, Area Subdivision Method.

**Shading:** Gouraud and Phong Shading Algorithms, Properties of Bezier and B-Spline Curves.

**Recommended Books:**

1. Computer Graphics: By Donald Hearn, M. Pauline Baker
2. Computer Graphics (Schaum Series ) by Lipschutz (MC Graw Hill)
3. Principles of Interactive Computer graphics: By W.M. Newman, R.Sproull
4. Fundamentals of Interactive Computer Graphics: By J.D. Foley, A. Van Dam
5. Computer Graphics Using OPEN GL: By F.S. Hill Jr.
6. Computer Graphics: Roy A. Plastock, Gordon Kalley.

## CPE-212 MICROPROCESSOR & ASSEMBLY LANGUAGE PROGRAMMING

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 0 | 3.5 |

**Maximum Marks(Internal):50** **Maximum Marks(External):50**

**Minimum Pass Marks(External):40%**

**Course objectives:**

Describe the general architecture of a microcomputer system and architecture &organization of 8085 & 8086 Microprocessor and understand the difference between 8085 and advanced microprocessor. Understand and realize the Interfacing of memory & various I/O devices with 8085 microprocessor Understand and classify the instruction set of 8085 microprocessor and distinguish the use of different instructions and apply it in assembly language programming. Understand the architecture and operation of Programmable Interface Devices and realize the programming & interfacing of it with 8085 microprocessor

### Section-A

**Introduction of Microprocessor:** CPU, I/O devices, clock, memory, bus architecture, tri-state logic, address bus, data bus & control bus and their operations.

**Semiconductor Memories:** Development of semiconductor memory, internal structure and decoding, Read and Write timing diagrams, MROM, ROM, EPROM, EEPROM, DRAM.

**Architecture of 8-bit Microprocessor:** Intel 8085Amicroprocessor, Pin description and internal architecture.

**Operation and Control of Microprocessor:** Timing and control unit, op-code fetch machine cycle, memory read/write machine cycles, I/O read/write machine cycles, state transition diagram.

**Instruction Set:** Instruction format, Addressing modes; Data transfer, arithmetic, logical, branch, stack and machine control groups of instruction set.

### Section-B

**Assembly Language Programming:** Assembler directives, simple examples; Subroutines, parameter passing to subroutines. Data transfer operations, 16-bit arithmetic instructions, 16-bit address operations.

**Interfacing:** Interfacing of memory chips, address allocation technique and decoding; Interfacing of I/O devices, LEDs and toggle-switches as examples , memory mapped and isolated I/O structure;

**I/O techniques:** CPU initiated unconditional and conditional I/O transfer, device initiated interrupt I/O transfer.

**Code Conversions:** BCD to binary to ASCII and vice-versa, BCD addition and subtraction, BCD to 7-segment LED code conversion.

**Programmable Peripheral Interface:** Intel 8255 A, pin configuration, internal structure of a port bit, modes of operation, bit SET/RESET feature, programming; ADC and DAC chips and their interfacing.

**Interrupts:** Interrupt structure of 8085A microprocessor, processing of vectored and non-vectored interrupts, latency time and response time; Handling multiple interrupts

**Programmable Interval Timer:** Intel 8253, pin configuration, internal block diagram of counter and modes of operation, counter read methods ,programming. 8257 DMA controller and 8259 interrupt controller. Serial I/O operations.

**Recommended Books:**

1. Hall, D. V., “Microprocessor and Interfacing-Programming and Hardware”, 2nd Ed., Tata McGraw-Hill Publishing Company Limited, 2008.
2. Gaonkar R. S., “Microprocessor Architecture, Programming and Applications”, 5th Ed., Penram International, 2007.
3. Stewart J, “Microprocessor Systems- Hardware, Software and Programming”, Prentice Hall International Edition,1990.
4. Short K. L., “Microprocessors and Programmed Logic”, 2nd Ed., Pearson Education, 2008.
5. B.Ram, Introduction to Microprocessors and Assembly Language.

**CPE-257 WEB TECHNOLOGIES LAB**

| L | T | P | Cr |
|---|---|---|---|
| 0 | 0 | 2 | 1.0 |

**Total Marks:100**

**LIST OF PRACTICALS**

1. Create your biodata with the help of simple HTML Tags

2. Creation of Web page using HTML Table Tags.

3. Create a Simple website using HTml.

4. Example of internal CSS.

5. Example of External CSS.

6. Implementing basic concepts of PHP.

7. Example of get and post methods.

8. Implementing Sessions with PHP.

9. Create Signup and Login Page using PHP and MySQL

10. Create a Dynamic Website with the help of PHP and MySQL.

**CPE-258 OPERATING SYSTEM LAB**

| L | T | P | Cr |
|---|---|---|---|
| 0 | 0 | 2 | 1.0 |

**Total Marks:100**

## HARDWARE LAB

### LIST OF PRACTICALS

1. Identification of various computer components: motherboard, processor, system buses, expansion buses and pc power supplies memories etc.
2. PC assembling

## OPERATING LAB

### LIST OF PRACTICALS

1. Familiarization of UNIX/LINUX Environment.
2. Installation and Administration of UNIX/LINUX operating system.
3. Implementation of common commands of UNIX operating systems.
4. Working on vi editor using its different modes.
5. Redirection of input and output using Filters and Pipes.
6. Shell programming and its features.
7. Implementation of programs using shell scripts.

**Recommended Books:**

1. Forouzan UNIX and Shell Programming 1st Edition, Cengage Learning (Thomson)
2. Subhadeep Choudhury 'The A to Z of PC hardware and Maintenance', Dhannpat Rai & Co.

**CPE-260 COMPUTER GRAPHICS LAB**

| **L** | **T** | **P** | **Cr** |
|---|---|---|---|
| 0 | 0 | 2 | 1.0 |

**Total Marks:100**

**LIST OF PRACTICALS**

The students are required to do exercises on various computer graphics algorithms in either C/C++ Language. Implement following using various algorithms:

1. Line drawing
2. Line clipping
3. circle drawing
4. area clipping
5. drawing of some 2-D pictures
6. 2-D transformations: rotation, translation etc
7. Shading
8. Line Hiding

Finally design some Ads., Game etc using all the above or built in commands.

## CPE-262 MICROPROCESSOR & ASSEMBLY LANGUAGE PROGRAMMING LAB

| L | T | P | Cr |
|---|---|---|---|
| 0 | 0 | 2 | 1.0 |

**Total Marks:100**

### LIST OF PRACTICALS

1. Introduction to 8085 kit.
2. Writing a few assembly language utility programs for logical, arithmetic, shift operations, code conversion and delay routines.
3. Writing assembly language programs for interfacing of following chips with 8085:
   a. Programmable peripheral interface, 8255
   b. Programmable interval timer, 8253
   c. Programmable keyboard/display interface, 8279
   d. DMA Controller, 8257
   e. Programmable Interrupt Controller, 8259
4. Interfacing of analog to digital converters with 8085
5. Interfacing of digital to analog converters with 8085

## DRUG ABUSE: PROBLEM, MANAGEMENT AND PREVENTION

### (FOR ALL UNDERGRADUATE COURSES)

**Note: This is a compulsory qualifying paper, which the students have to study and qualify during three years of their degree course**.

**Maximum Marks(Internal):30** **Maximum Marks(External):70**

### INSTRUCTIONS FOR THE PAPER SETTERS

The question paper will consist of three sections A, B and C. Each of sections A and B will have four questions from the respective sections of the syllabus. Each question shall carry 7 marks. Section C will consist of 14 short answer type of 2 marks each.

### INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt any three questions from section A and any three questions from section B. Section C is compulsory.

### SECTION A

**UNIT: I – Problem of Drug Abuse: Concept and Overview; Types of Drug Often Abused**

**(a) Concept and Overview**

What are drugs and what constitutes Drug Abuse?; Prevalence of menace of Drug Abuse; How drug Abuse is different from Drug Dependence and Drug Addiction?; Physical and psychological dependence- concepts of drug tolerance

**(b) Introduction to drugs of abuse: Short Term, Long term effects & withdrawal symptoms**

**Stimulants:** Amphetamines, Cocaine, Nicotine
**Depressants:** Alcohol, Barbiturates- Nembutal, Seconal, Phenobarbital Benzodiazepines – Diazepam, Alprazolam, Flunitrazepam
**Narcotics:** Opium, morphine, heroin
**Hallucinogens:** Cannabis & derivatives (marijuana, hashish, hash oil)
**Steroids Inhalants**

**UNIT: II –Nature of the Problem**

Vulnerable Age Groups. Signs and symptoms of Drug Abuse: (a)- Physical indicators; (b)- Academic indicators; (c)- Behavioral and Psychological indicators

### SECTION B

**UNIT: III – Causes and Consequences of Drug Abuse**

a) **Causes:** Physiological; Psychological; Sociological
b) **Consequences of Drug Abuse:** For individuals, For families; For society & Nation

**Unit: IV- Management & Prevention of Drug Abuse**

Management of Drug Abuse, Prevention of Drug Abuse. Role of Family, School, Media, Legislation & Deaddiction Centers

**Suggested reading**s

1. Kapoor. T. (1985) Drug Epidemic among Indian Youth, New Delhi: Mittal Pub
2. Modi, Ishwar and Modi, Shalini (1997) Drugs: Addiction and Prevention,Jaipur: Rawat Publication.
3. Ahuja, Ram,(2003), Social Problems in India, Rawat Publications: Jaipur
4. 2003 National Household Survey of Alcohol and Drug Abuse. New Delhi, Clinical Epidemiological Unit, All India Institute of Medical Sciences, 2004.
5. World Drug Report 2011, United Nations Office of Drug and Crime.
6. World Drug Report 2010, United nations Office of Drug and Crime.
7. Extent, Pattern and Trend of Drug Use in India, Ministry of Social Justice and Empowerment, Government of India, 2004.
8. The Narcotic Drugs and Psychotropic Substances Act, 1985, (New Delhi: Universal, 2012)

**Pedagogy of the Course Work:**

The pedagogy of the course work will consist of the following: 70% lectures (including expert lectures); 30% assignments, discussion and seminars and class tests.
Note: A visit to drug de-addiction centre could also be undertaken.

**HSS-201 MANAGEMENT PRACTICE & ORGANIZATION BEHAVIOUR**

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 0 | 3.5 |

**Maximum Marks(Internal):50** **Maximum Marks(External):50**

**Minimum Pass Marks(External):40%**

**Course Objectives:**

To give a basic perspective of management theories and practices. This will form foundation to study other functional areas of management and to provide the students with the conceptual framework and the theories underlying Organizational Behavior.

**SECTION-A**

Introduction to Management: Definition, Importance and functions of Management. Theories of Management; Classical, Neo-classical and Modern. Planning: Nature of planning, planning process, types of plans, Importance and Limitations of Planning. Introduction to MBO (Management by Objectives). Social responsibility of business.

Decision Making: Importance and Process. Organization: Process of Organizing, Organizing Principles, Organization Chart, Authority and Responsibility relationship, Steps in Delegation of Authority. Communication: Process, channels, medium of communication, communication barriers. Controlling: Steps, types of control system, essentials.of effective control system.

**SECTION-B**

Organizational Behaviour: Concept, features and importance. Personality: determinants and development. Role of Values and Attitudes in individual's behaviour. The concept of motivation and its theories. Perception: Concept, Process, Errors in perceptual accuracy, Role of perception in decision making

Learning: Classical and Operant conditioning theory, Reinforcement-kinds and administration. Concept of group dynamics. Leadership theories and styles. Organizational conflict: Concept, Dimensions, conflict management techniques. Introduction to concept of power and politics in work related organization. Organization culture and effectiveness

**Recommended Books:**

1. Aswathappa, K and Reddy G. Sudarsana, Management and Organisation Behaviour, Himalya Publishing House.
2. Pierce John L., Gardner Donald, Gardner Donald, Management and Organisational Behavior: An Integrated Perspective, Ed.1, Cengage Learning India
3. Laurie Mullins, Management and Organisation Behaviour, 7/e, Pearson Education.
4. Stephen, P. Robbins, Seema Sanghi and Timothi A Judge, Organizational Behavior 13/e, Pearson Education.
5. Stephen P. Robbins, Mary Coulter and Neharika Vohra, Management 10/e, Pearson Education.
6. Heinz, Weihrich and Harold Koontz, Essentials of Management, Tata McGraw Hill.
7. Gene Burton and Manab Thakur, Management Today: Principles and Practice, Tata McGraw-Hill.
8. P C Tripathy, P N Reddy, Principles of Management, Tata McGraw-Hill.
9. Dr. Neeru Vashishth, Principles of Management with case studies, Taxmann Publication.
10. L.M.Prasad, Principles & Practice of Management, Sultan Chand & Sons N Delhi

James Stoner, R Edward Freeman and Daniel R Gilbert, Management 6/e, Pearson Education.

**CPE-211 BUILDING ENTERPRISE APPLICATIONS**

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 0 | 3.5 |

**Maximum Marks(Internal):50** **Maximum Marks(External):50**

**Minimum Pass Marks(External):40%**

**Course Objectives:**

- The course provides students with the basic concepts of ERP systems for manufacturing or service companies, and the differences among (Material Requirement Planning) MRP, MRP II, and ERP systems
- Apply the principles of ERP systems, their major components, and the relationships among these components
- With the knowledge of typical ERP systems, and the advantages and limitations of implementing ERP systems.
- To comprehend the technical aspects of ERP systems
- To be able to map business processes using ERP concepts and techniques.

**SECTION-A**

**Introduction to ERP:** Definition of ERF, characteristics of ERP, Impact of ERP

**Functioning of ERP System:** Value chain and supply chain, predecessor of ERP, ERP System and its Extensions.

**ERP Architecture:** Logical architecture, Physical IT architecture, mainframe architecture, cliet-server architecture, browser architecture.

**SECTION-B**

**ERP Implementation:** phases of ERP cycle, Model building strategy, functional fit analysis, Significance and methods of Risk analysis, Significance and methods of cost-benefit analysis.

**Introduction -** ERP and open source software, ERP and Corporate Governance, ERP and shared services, ERP criticism

***Recommended Books:***

1. "A Guide to ERP Benefits, Implementation and Trends", Prof. dr. Lineke Sneller RC
2. "ERP: The Implementation Cycle", Stephen Harwood
3. "Enterprise Resource Planning Systems: Systems, Life Cycle, Electronic", Daniel Edmund O'Leary
4. "Enterprise Resource Planning", Mary Sumner

**CPE - 213 BUSINESS INTELLIGENCE**

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 0 | 3.5 |

**Maximum Marks(Internal):50** **Maximum Marks(External):50**

**Minimum Pass Marks(External):40%**

## SECTION-A

**Introduction to Business Intelligence:** Introduction to OLTP and OLAP, BI Definitions & Concepts, Business Applications of BI, BI Framework, Role of Data Warehousing in BI, BI Infrastructure Components – BI Process, BI Technology, BI Roles & Responsibilities

**Basics of Data Integration (Extraction Transformation Loading):** Concepts of data integration need and advantages of using data integration, introduction to common data integration approaches, introduction to ETL using SSIS, Introduction to data quality, data profiling concepts and applications

## SECTION-B

**Introduction to Multi-Dimensional Data Modeling:** Introduction to data and dimension modeling, multidimensional data model, ER Modeling vs. multi dimensional modeling, concepts of dimensions, facts, cubes, attribute, hierarchies, star and snowflake schema, introduction to business metrics and KPIs, creating cubes using SSAS

**Basics of Enterprise Reporting:** Introduction to enterprise reporting, concepts of dashboards, balanced scorecards, introduction to SSRS Architecture, enterprise reporting using SSRS

**Recommended Books:**

1. R.N. Prasad and Seema Acharya, Fundamentals of Business Analytics, Wiley India Ltd.
2. Mike Biere, Business Intelligence for the Enterprise, Prentice Hall Professional.
3. Teo Lachev, Applied Microsoft Analysis Services 2005: And Microsoft Business Intelligence Platform, Prologika Press.
4. David Taniar, Progressive methods in data warehousing and business intelligence: concepts and competitive analytics, Idea Group Inc (IGI).
5. Data warehousing: the ultimate guide to building corporate business intelligence, Birkhäuser.
6. Mark Humphries, Michael W. Hawkins, Michelle C. Dy, Data warehousing: architecture and implementation, Prentice Hall Professional.

**MBA- 5011 FOUNDATIONS OF FINANCIAL ACCOUNTING**

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 0 | 3.5 |

**Maximum Marks(Internal):50** **Maximum Marks(External):50**

**Minimum Pass Marks(External):40%**

**Introduction to Financial Accounting**

**Financial Statements:** Balance Sheet, Income Statement, Statement of cash flows. Mechanics of Accounting: Transaction Analysis, Journal Entries, Trial of Balance. **Completing the Accounting Cycle:** Accrual Accounting, Adjusting Entries, Preparing Financial Statements. **Ensuring the Integrity of Financial Information:** Problems, Safeguards. Selling a Product or a Service: Revenue Recognition, Cash Collection, Accounts Receivable. Inventories: Nature of Inventories, Valuation Methods.

**Recommended Books:**

1. Khan and Jain, Financial Management, Tata McGraw-Hill Publishing Co. Ltd., New Delhi, 4th Edition.
2. Robert Anthony, David F. Hawkins and Kenneth A. Merchant, Accounting-Text and Cases, Tata McGraw-Hill Publishing Co. Ltd., New Delhi, 12th Edition, 2007.

**B. TECH THIRD YEAR**
**COMPUTER SCIENCE & ENGINEERING**

**(Batch 2020)**
**Session (2022-23)**

**SCHEME OF PAPERS**

**FIFTH SEMESTER (COMPUTER SCIENCE & ENGINEERING)**

| S. No. | Subject Code | Subject Name | L | T | P | Cr. |
|---|---|---|---|---|---|---|
| 1. | CPE-301 | Theory of Computation | 3 | 1 | 0 | 3.5 |
| 2. | CPE-302 | Cryptography and Network Security | 3 | 1 | 0 | 3.5 |
| 3. | CPE-303 | Artificial Intelligence | 3 | 1 | 0 | 3.5 |
| 4. | CPE-304 | Java Programming | 3 | 1 | 0 | 3.5 |
| 5. | CPE-305 | Algorithm Analysis & Design | 3 | 1 | 0 | 3.5 |
| 6. | CPE-306 | Digital Image Processing | 3 | 1 | 0 | 3.5 |
| 7. | CPE-352 | Cryptography and Network Security Lab | 0 | 0 | 2 | 1.0 |
| 8. | CPE-354 | Java Programming Lab | 0 | 0 | 2 | 1.0 |
| 9. | CPE-355 | Algorithm Analysis & Design Lab | 0 | 0 | 2 | 1.0 |
| 10. | CPE-356 | Digital Image Processing Lab | 0 | 0 | 2 | 1.0 |
| 11. | STG-351 | Summer Training ** | - | - | - | 6.0 |
| **Total** | | | **18** | **6** | **8** | **31** |
| **Total Contact Hours = 32** | | | | | | |

CPE-352, CPE-354, CPE-355, and CPE-356 are practical papers only. There will not be any theory examination for these papers.

** Summer Training will be of 4 to 6 weeks duration in Industry / In House.

## Department of Computer Science & Engineering

Punjabi University, Patiala.

## General Instructions to the Paper Setters

(Common for B.Tech. in Computer Science & Engineering, Electronics and Communication Engineering, Mechanical Engineering, Civil Engineering and Integrated B.Tech/MBA Branches)

**Pattern of Question Paper**

TITLE OF SUBJECT (CODE----)

Bachelor of Technology (Branch) Section: ……..

End Semester Exam

TIME ALLOWED: 3 Hour Roll. No…….

Maximum Marks: 50

Pass Marks : 20

Note:- Section C is compulsory. Attempt any six questions selection three questions from each section A & B.

**Section-A (From Section A of the syllabus)**

Q1. .....

Q2. .....

Q3. .....

Q4. ..... 3x5

Q5……..

**Section-B (From Section B of the syllabus)**

Q6. .....

Q7. .....

Q8. .....

Q9. ..... 3x5

Q10…….

**Section-C (From whole syllabus)**

Q11

a).....

b).....

c).....

d).....

e).....

f).....

g).....

h).....

i).....

j)……. 10x2=20

***Note for the paper setter:***

1. Total numbers of questions to be set are Eleven (11) as per the above format.
2. There will be five questions in each of the Sections A and B. Each question will be of five (05) marks. However, a question may be segregated into subparts. Candidates will be required to attempt SIX questions by selecting three Questions from each Sections A & B.
3. Section C is compulsory and contains ten (10) sub-parts each of two (2) marks.
4. The maximum limit on numerical problems to be set in the paper is 35%.
5. The paper setter shall provide detailed marking instructions and solutions to numerical problems for evaluation purpose in the separate white envelopes provided for solutions.
6. The paper setters should seal the internal & external envelope properly with signatures & cello tape at proper place.
7. Log tables, charts, graphs, Design data tables etc. should be specified, whenever needed.
8. Use of Scientific calculator should be clearly specified.

**CPE-301** **THEORY OF COMPUTATION**

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 0 | 3.5 |

**Maximum Marks(Internal):50** **Maximum Marks(External):50**

**Minimum Pass Marks(External):40%**

**Course Objective:**

- The goal of this course is to provide students with an understanding of basic concepts in the theory of computation.
- To construct finite state machines and the equivalent regular expressions
- To prove the equivalence of languages described by finite state machines and regular expressions.
- To construct pushdown automata, Turing machine and the equivalent context free grammars.
- To prove the equivalence of languages described by pushdown automata and context free grammars.

## SECTION-A

**Sets, Relations and Languages:** Sets, Relations and functions, finite and infinite sets, Closures and algorithms, alphabets and languages

**Finite Automata:** Deterministic Finite Automata (DFA), Non Deterministic Finite Automata (NDFA), Moore and Mealy Machine, Application of finite automata, Conversion of NDFA to DFA, Mealy to Moore and Moore to Mealy

**Grammar:** Definition of Grammars, Derivation & Language generated by Grammars, Chomsky Classification of Languages

**Regular Expression and Languages:** Regular expression, finite Automata and Regular expression, Properties of Regular Languages, Pumping lemma for regular languages, application of pumping lemma, Closure properties of regular languages, Minimization of finite Automata.

## SECTION-B

**Context free Grammar and Languages:** Context free grammar: Parse Trees, Ambiguity in Grammar and Languages, Construction of Reduced Grammars

**Properties of Context free languages** – Normal forms for context free grammars, Chomsky Normal Form (CNF), Greibach Normal Form (GNF)

**Pushdown Automata:** Pushdown Automata: Deterministic Push down Automata, Equivalence of Push Down automata and Context free Grammar.

**Turing Machines:** Definition of Turing Machine, Application of Turing Machine in language accepting and computing.

**Cellular Automata:** Formal Language aspects, Algebraic Properties Universality & Complexity Variants.

**Recommended Books:**

1. K.L.P. Mishra, N. Chandrasekaran, “Theory of Computer Science, Automata, Languages and Computation”, PHI
2. J.E .Hopcroft, R. Motwani and J.D. Ullmn, “Introduction to Automata Theory, Language and Computation”, Pearson Education Asia, 2nd Edition.
3. B.M. Moret, “The Theory of Computation”, Pearson Education Asia.
4. H.R. Lewis and C.H. Papa dimitriou, “Elements of the theory of Computation”, Pearson Education Asia, 2nd Edition.

**CPE-302 CRYPTOGARPHY AND NETWORK SECURITY**

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 0 | 3.5 |

**Maximum Marks(Internal):50** **Maximum Marks(External):50**

**Minimum Pass Marks(External):40%**

**Course Objectives:**

- To understand the fundamentals of Cryptography
- To acquire knowledge on standard algorithms used to provide confidentiality, integrity and authenticity.
- To understand the various key distribution and management schemes.
- To understand how to deploy encryption techniques to secure data in transit across data networks
- To design security applications in the field of Information technology

## SECTION A

**Basic Encryption And Decryption:** Attackers and Types of threats, challenges for information security, Encryption Techniques, Classical Cryptographic Algorithms: Mono-alphabetic Substitutions such as the Caesar Cipher, Cryptanalysis of Mono-alphabetic ciphers, Polyalphabetic Ciphers such as Vigenere, Vernam Cipher, Stream and Block Ciphers.

**Secret Key Systems:** The Data encryption Standard (DES), Analyzing and Strengthening of DES, Introduction to Advance Encryption Standard (AES)

**Public Key Encryption Systems:** Concept and Characteristics of Public Key Encryption system, Introduction to Merkle-Hellman Knapsacks, Rivets – Shamir-Adlman (RSA) Encryption.

## SECTION B

**Hash Algorithms:** Hash Algorithms, Message Digest Algorithms such as MD4 and MD5, Secure Hash Algorithms such as SH1 and SHA2.

**Network Security:** Kerberos, IP security: Architecture, Authentication Header, Encapsulating Security Payload, Digital Signatures and Digital Signature Standards.

**Web Security:** Web security consideration, secure socket Layer protocol, Transport Layer Security Secure Electronic Transaction Protocol.

**Firewalls:** Firewall Design principles, Characteristics, Types of Firewall, trusted systems, Virtual Private Networks.

**Recommended Books:**

1. Principles of Cryptography, William Stallings, Pearson Education
2. “Security in Computing (Second Edition)’, Charles P.Pfleeger, 1996, Prentice Hall International, Inc.
3. Cryptography & Network Security, Atul Kahate, TMH

**CPE - 303 ARTIFICIAL INTELLIGENCE**

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 0 | 3.5 |

**Maximum Marks(Internal):50** **Maximum Marks(External):50**

**Minimum Pass Marks(External):40%**

**Course Objectives:**

• To have an appreciation for and understanding of both the achievements of AI and the theory underlying those achievements.

• To have an appreciation for the engineering issues underlying the design of AI systems.

• To have a basic proficiency in a traditional AI language including an ability to write simple to intermediate programs and an ability to understand code written in that language.

• To have a basic understanding of some of the more advanced topics of AI such as learning, natural language processing, agents and robotics, expert systems, and planning.

**SECTION-A**

**Introduction:** Artificial Intelligence Techniques, levels of models, understand the importance, functions, advantages, as well as the limitations of artificial intelligence. Use of Artificial Intelligence and intelligent agents .

**Problem solving and Knowledge Representation techniques:** State, space, search, control strategies, heuristic search, problem characteristics, production system characteristics. Mapping between facts and representations, approaches to knowledge representation, semantic sets, frame, conceptual depending, scripts, predictive logic, resolution in predicate logic

**SECTION-B**

**Knowledge representation and reasoning :** Procedural Vs declarative knowledge, matching, conflict resolution, Non-monotonic reasoning, default reasoning, statistical reasoning, knowledge extraction. Investigate the roles and development methods of artificial intelligence in decision making processes. Neural network resources, cognitive science, role of neural network in computer science.

**Natural language processing and expert system:** Basic Tasks of Natural Language processing, Expert systems, Expert system examples, Expert System Architectures, Rule base Expert systems, Non Monotonic Expert Systems, Decision tree base Expert Systems.

**LISP:** Characteristics of AI language, LISP-symbol manipulation- basic lisp function, predicated, condition, recursion, iteration, Array-lambda functions, input-output statements.

**AI problems :** Pattern recognition, Voice recognition, Feature Extraction

**Recommended Books :**

1. Artificial Intelligence by Rich and Kinght, TMH

2. Introduction to Artificial Intelligence by Charniak and Mcdermott. Addison-Wesley, 1985.

3. Essentials of Artificial Intelligence by Ginsburg. Morgan Kaufmann, 1993.

4. Artificial Intelligence by Winston 3rd Edition, Addison Wesley, 1992. 5. Artificial Intelligence by Padhy, Oxford Press.

**CPE-304 JAVA PROGRAMMING**

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 0 | 3.5 |

**Maximum Marks(Internal):50** **Maximum Marks(External):50**

**Minimum Pass Marks(External):40%**

**Course Objectives:**

- The model of object oriented programming: abstract data types, encapsulation, inheritance and polymorphism
- Fundamental features of an object oriented language like Java: object classes and interfaces, exceptions and libraries of object collections
- How to take the statement of a business problem and from this determine suitable logic for solving the problem; then be able to proceed to code that logic as a program written in Java.
- How to test, document and prepare a professional looking package for each business project using javadoc.

## SECTION-A

**Introduction to Java :** Features of Java, difference between Java and C++, JVM, Bytecode, data types, Wrapper types, variables, arrays, operators-arithmetic, bit-wise, relational, Boolean, various control statements.

**Introduction to Classes:** Class fundamentals, declaring objects, methods, constructors, garbage collection, passing parameters to methods, recursion.

**Inheritance:** types of inheritance, Access Modifiers (Private, Public, Protected, Default), Polymorphism (Overloading, Overriding, Super & This Keyword), Final Variable, Final Classes & Methods, Static variable Static method, Abstract methods and classes , Packages and interfaces, importing packages.

**Exception Handling**: Exception types, try, catch, finally, throw and throws, creating exception subclasses**.**

## SECTION-B

**Multithreading:** Multithread programming, thread priorities, synchronisation, interthread communication, Thread class methods, runnable interface,

**I/O:** Input/Output, streams, reading and writing console input/output, reading and writing files,

**Applets and Graphics:** Applet fundamentals; Applet class; Applet initialization and termination; event handling; keyboard and mouse events; AWT class; Layout managers; panels; canvases; Frame windows; drawing lines, rectangles, ellipses.

**JDBC programming:** Commonly used classes and interfaces of java.sql package, connecting java application to a database, prepared statements.

**Advance Concepts:** Introduction to Java Beans, Java Swings, Java Server Pages.

**Recommended Books :**

1.Dietel and Dietal, Java: How to Program, 6th Edition, Pearson Education

2.Herbert Schildt The Complete Reference Java2, TMH

3.James Edward Keogh, Jim Keogh J2EE: The complete Reference, McGraw-Hill

**CPE-305 ALGORITHM ANALYSIS & DESIGN**

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 0 | 3.5 |

**Maximum Marks(Internal):50** **Maximum Marks(External):50**

**Minimum Pass Marks(External):40%**

**Course Objectives:**

- Analyze the asymptotic performance of algorithms.
- Write rigorous correctness proofs for algorithms.
- Demonstrate a familiarity with major algorithms and data structures.
- Apply important algorithmic design paradigms and methods of analysis.
- Synthesize efficient algorithms in common engineering design situations.

## SECTION-A

**Introduction:** Algorithm, analyzing algorithms, internal and external sorting, sets, graphs, stacks, queues, trees, heaps, graphs, hashing.

**Divide and Conquer:** General method, binary search, Min-max problem, Merge sort, Quick sort, Strassen's matrix multiplication.

**Greedy Method:** General Method, Job sequencing with deadlines, Knapsack problem, minimum spanning trees, single source shortest paths.

## SECTION-B

**Dynamic Programming:** General Method multistage graphs, Optimal Binary search tree, All pairs shortest path, traveling salesman problem.

**Backtracking:** 8 queens problem, sum of subsets, graph coloring, knapsack problem.

Branch & Bound Method, 0/1 Knapsack problem, Traveling salesman problem.

**Lower Bound Theory:** Lower bound technique, Comparison trees for sorting and searching, some lower bound on parallel computation.

**Problem classes:** P, NP, NP-hard & NP-complete, deterministic and non- deterministic polynomial time algorithm.

**Recommended Books:**

1. Fundamentals of Computer Algorithm, Latest edition, By Horowitz Sahni, Galgotia Publication.
2. Algorithms, Latest Edition, By knuth.
3. Design & Analysis of Algorithm, Latest Edition, By Goodman, McGraw hill Publication.

**CPE-306 DIGITAL IMAGE PROCESSING**

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 0 | 3.5 |

**Maximum Marks(Internal):50** **Maximum Marks(External):50**

**Minimum Pass Marks(External):40%**

**Course Objectives:**

- Understand what MFAs do and how they work
- Understand the fundamentals of diplomatic negotiations
- Understand bilateral and multilateral diplomacy
- Understand subject-specific diplomacy
- Understand what makes a document a "treaty"
- Be aware of historical cases relevant to various diplomatic methods

**SECTION-A**

**Introduction and Digital Image Fundamentals**: Digital Image representation, Spatial and Intensity resolutions, Binary Image, Gray scale image, Fundamental steps in Image processing, Image acquisition - X-ray imaging, Ultrasound, CT scan, MRI, Sampling and quantization, basic relationships like neighbor's connectivity between pixels, Image Histogram, Spatial Domain Image

**Processing methods**: Image Negative, log, power Law, Image smoothening (low pass) filter - Averaging filter, Image sharpening filter- first order derivative, second order derivative

**Discrete Fourier transform** : Importance of fourier spectrum and Phase angle, Steps of Frequency domain filtering algorithm, Ideal Lowpass filter, Ideal Highpass filter.

**Color image models:** RGB and CMY.

**SECTION-B**

**Image Restoration**: Image Degradation model, Gaussian Noise Model, Spatial domain restoration in presence of noise: Mean filter, Order statistic filters-Max, Min, Median.

**Image Compression**: Coding Inter-pixel and Psycho visual redundancy, Image Compression model, Metrics: Compression Ratio, Entropy and Mean Square Error, Error free compression: Huffman, Runlength coding, Lossy Compression: Introduction to still Image Compression standard-JPEG.

**Image Segmentation**: Detection of discontinuities- Laplacian operator, Gradient operator, Thresholding, Region Growing.

**Image Representation: U**sing chain code Method and Image description using statistical moments.

Image Recognition: Pattern, Pattern Classes, Matching by Correlation.

Define the terms: Digital Watermarking, Image Morphing, Image registration, Image Spoofing and Digital image forensics

**Reference Books:**

1. Rafael C. Gonzalez & Richard E. Woods, "Digital Image Processing", AWL.
2. Annadurai, "Fundamentals of digital image processing", Pearson Education
3. A.K. Jain," Fundamentals of Digital Image Processing", Pearson Education.
4. W. K. Pratt," Digital Image Processing".
5. Ramesh Jain, Brian G. Schunck, "Machine Vision", TMH.

**CPE-352 CRYPTOGRAPHY AND NETWORK SECURITY LAB**

| L | T | P | Cr |
|---|---|---|---|
| 0 | 0 | 2 | 1.0 |

**Total Marks:100**

**LIST OF PRACTICALS**

1. Write a C program that contains a string (char pointer) with a value \Hello World'. The program should XOR each character in this string with 0 and displays the result.
2. Write a C program that contains a string (char pointer) with a value \Hello World'. The program should AND or and XOR each character in this string with 127 and display the result
3. Write a Java program to perform encryption and decryption using the following algorithms
    a) Ceaser Cipher
    b) Substitution Cipher
4. Write a C/Java program to implement the DES algorithm logic
5. Write a Java program to implement RSA Algorithm
6. Demonstrate creation of Digital signatures using GNUPG
7. Demonstrate the concept of firewalls and honeypots
8. Creating virtual private network.
9. Installation of Wireshark and different filters for network monitoring.

**CPE-354 JAVA PROGRAMMING LAB**

| L | T | P | Cr |
|---|---|---|---|
| 0 | 0 | 2 | 1.0 |

**Total Marks:100**

**LIST OF PRACTICALS**

1. WAP to implement constructors and overloading.
2. WAP to implement recursion, functions and arrays.
3. WAP to implement Inheritance, interfaces and packages.
4. WAP which will explain the concept of try, catch and throw.
5. WAP to demonstrate threads and animations.
6. WAP to explain I/O streams and files and socket programming.
7. WAP to implements Applets and use of it on internet.
8. WAP to describe AWT Class, Frames, Panels and Drawing.
9. WAP to demonstrate JDBC and build an application.
10. WAP to implements use of JSP.

**CPE-355 ALGORITHM ANALYSIS & DESIGN LAB**

| L | T | P | Cr |
|---|---|---|---|
| 0 | 0 | 2 | 1.0 |

**Total Marks:100**

**LIST OF PRACTICALS**

1. Write a program to sort ‘n’ numbers using merge sort. Mention the numbers of comparisons made by the program.

2. Write a program to sort ‘n’ numbers using quick sort. Mention the numbers of comparisons made by the program.

3. Write a program for stressor's matrix multiplication.

4. Write a program for knapsack problem.

5. Write a program for minimum spanning trees.

6. Write a program for single source shortest paths.

7. Write a program of traveling salesman problem.

8. Write a program for all pairs shortest paths

**CPE-356 DIGITAL IMAGE PROCESSING LAB**

| L | T | P | Cr |
|---|---|---|---|
| 0 | 0 | 2 | 1.0 |

**Total Marks: 100**

The students have to perform following set of experiments:

1. Reading and displaying images in different formats using different color models.
2. Converting color images into monochrome images,
3. Displaying of image Histogram
4. Images enhancements using grey level transformations
5. Frequency domain filtering of the image
6. Spatial domain Image Noise removal
7. Image color enhancements using pseudo coloring techniques.
8. Point, Line, and Edge Detections in images
9. Boundary Detections in images
10. Image segmentation using Thresholding of Images
11. Object Recognition Technique

## B. TECH THIRD YEAR

## COMPUTER SCIENCE & ENGINEERING

**(Batch 2020)**
**Session (2022-23)**

## SCHEME OF PAPERS

### SIXTH SEMESTER (COMPUTER SCIENCE & ENGINEERING)

| S. No. | Subject Code | Subject Name | L | T | P | Cr. |
|---|---|---|---|---|---|---|
| 1. | CPE-308 | RDBMS Using PL/SQL | 3 | 1 | 0 | 3.5 |
| 2. | CPE-309 | Mobile Apps Development | 3 | 1 | 0 | 3.5 |
| 3. | CPE-310 | Compiler Design | 3 | 1 | 0 | 3.5 |
| 4. | CPE-311 | Cloud Computing | 3 | 1 | 0 | 3.5 |
| 5. | CPE-312 | Machine Learning | 3 | 1 | 0 | 3.5 |
| 6. | | Elective-II * | 3 | 1 | 0 | 3.5 |
| 7. | CPE-358 | RDBMS Using PL/SQL Lab | 0 | 0 | 2 | 1.0 |
| 8. | CPE-359 | Mobile Apps Development Lab | 0 | 0 | 2 | 1.0 |
| 9. | CPE-362 | Machine Learning Lab | 0 | 0 | 2 | 1.0 |
| 10. | HSS-351 | Communication Skills Lab | 0 | 0 | 2 | 1.0 |
| **Total** | | | **18** | **6** | **8** | **25** |
| **Total Contact Hours = 34** | | | | | | |
| | | Open Elective** | 3 | 0 | 0 | 0.0 |

### ELECTIVE SUBJECTS – II*

| S. No. | Subject Code | Subject Name | L | T | P | Cr. |
|---|---|---|---|---|---|---|
| 1. | CPE-314 | Internet of Things | 3 | 1 | 0 | 3.5 |
| 2. | CPE-316 | Embedded System | 3 | 1 | 0 | 3.5 |
| 3. | CPE-317 | Biometric Security | 3 | 1 | 0 | 3.5 |
| 4. | MBA-5012 | Foundations of Managerial Accounting | 3 | 1 | 0 | 3.5 |

***Choose any one from the list. Elective under Massive Open Online Courses (MOOCS) available on SWAYAM platform of Govt. of India offered through online mode. The subjects which students can opt from MOOCS will be notified by the department semester wise time to time**

### OPEN ELECTIVE FOR SIXTH SEMESTER (Offered By Computer Sc. & Engg.)**

| S. No. | Subject Code | Subject Name | L | T | P | Cr. |
|---|---|---|---|---|---|---|
| 1. | | Essentials of Computers<br>(To other departments of the University) | 3 | 0 | 0 | 0.0 |

CPE-358, CPE-359, CPE-361, CPE-362 and HSS-351 are practical papers only. There will not be any theory examination for these papers.

** The list of Open Elective Subjects will be notified by the department to the students. The Open elective course is optional and not mandatory. Students can opt for this course as an additional subject.

## Department of Computer Science & Engineering

Punjabi University, Patiala.

## General Instructions to the Paper Setters

(Common for B.Tech. in Computer Science & Engineering, Electronics and Communication Engineering, Mechanical Engineering, Civil Engineering and Integrated B.Tech/MBA Branches)

**Pattern of Question Paper**

TITLE OF SUBJECT (CODE----)

Bachelor of Technology (Branch) Section: ……..

End Semester Exam

TIME ALLOWED: 3 Hour Roll. No…….

Maximum Marks: 50

Pass Marks : 20

Note:- Section C is compulsory. Attempt any six questions selection three questions from each section A & B.

**Section-A (From Section A of the syllabus)**

Q1. .....

Q2. .....

Q3. .....

Q4. ..... 3x5

Q5……..

**Section-B (From Section B of the syllabus)**

Q6. .....

Q7. .....

Q8. .....

Q9. ..... 3x5

Q10…….

**Section-C (From whole syllabus)**

Q11

a).....

b).....

c).....

d).....

e).....

f).....

g).....

h).....

i).....

j)……. 10x2=20

***Note for the paper setter:***

1. Total numbers of questions to be set are Eleven (11) as per the above format.
2. There will be five questions in each of the Sections A and B. Each question will be of five (05) marks. However, a question may be segregated into subparts. Candidates will be required to attempt SIX questions by selecting three Questions from each Sections A & B.
3. Section C is compulsory and contains ten (10) sub-parts each of two (2) marks.
4. The maximum limit on numerical problems to be set in the paper is 35%.
5. The paper setter shall provide detailed marking instructions and solutions to numerical problems for evaluation purpose in the separate white envelopes provided for solutions.
6. The paper setters should seal the internal & external envelope properly with signatures & cello tape at proper place.
7. Log tables, charts, graphs, Design data tables etc. should be specified, whenever needed.
8. Use of Scientific calculator should be clearly specified.

**CPE-308 RDBMS USING PL/SQL**

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 0 | 3.5 |

**Maximum Marks(Internal):50** **Maximum Marks(External):50**

**Minimum Pass Marks(External):40%**

**Course Objectives:**

- Describe basic concepts of database system
- Design a data model and schemas in RDBMS
- Use RDBMS for developing industry applications
- Be competent in use of PL/SQL
- Implement transactions, concurrency control, and be able to do Database recovery.

## SECTION-A

**Introduction of DBMS:**

DBMS architecture, Enhanced-ER (EER) Model Concepts: Specialization and Generalization, Union type, Constraints on Specialization and Generalization, Concept of Hierarchy and Lattice, EER-to-Relational Mapping.

**Distributed Databases and Client-Server Architecture:** Introduction to Distributed DBMS Concepts, Client-Server Architecture Overview, Data Fragmentation, Replication, and Allocation Techniques for Distributed Database Design, Types of Distributed Database Systems.

**PL/SQL:** Block Structure, Data Types, Creation of Variable, Scope, Nested Blocks, Control Structures. Records and Collections. Using SQL with PL/SQL: Cursors and its types. Subprograms: Stored and Local Procedures and Functions, Procedure vs Function.

**Packages:** Specification and Body, Triggers and its types. Introduction to Objects: Creating, Storing and Manipulating Objects.

## SECTION-B

**Database Security:** Types of Security, Control Measures, DB security and DBA, Access protection, Discretionary Access Control based on Granting and Revoking privileges. User Creation and Management in SQL: Creating a user, Assigning and Removing User Privileges, Creating and Assigning Roles.

**Transaction processing:** Introduction, Concurrency, Problems due to concurrency, ACID Properties, Schedule, Serializability. Serial, Non-serial and Conflict-Serializable Schedule

**Concurrency control:** Locks, Types of Locks: Binary and Two Phase Locking, Variations of Two Phase Locking. Deadlock: Deadlock Prevention Techniques, Deadlock Detection and Recovery. Database Recovery Concepts.

**Big Data:** Types of data, elements, role of parallel and distributed computing

**Recommended Books :**

1. Navathe and Elmasri, Fundamentals of Database Systems, Pearson education
2. Korth and Silberschatz Abraham, Database Concepts, McGraw Hall, 1991.
3. An introduction to database system by C.J.Date (Addison Welsey, Publishing house) Latest edition.
4. Bipin Desai, Database System, TMG
5. Prateek Bhatia, Database Management system, Kalyani Publishers

**CPE-309 MOBILE APPS DEVELOPMENT**

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 0 | 3.5 |

**Maximum Marks(Internal):50** **Maximum Marks(External):50**

**Minimum Pass Marks(External):40%**

**Course Objectives:**

- Describe those aspects of mobile programming that make it unique from programming for other platforms,
- Critique mobile applications on their design pros and cons,
- Utilize rapid prototyping techniques to design and develop sophisticated mobile interfaces,
- Program mobile applications for the Android operating system that use basic and advanced phone features, and
- Deploy applications to the Android marketplace for distribution.

**SECTION - A**

**Getting started with Mobility:** Mobility landscape, Mobile platforms, Mobile apps development, Overview of Android platform, setting up the mobile app development environment along with an emulator, a case study on Mobile app development

**Building blocks of mobile apps:** App user interface designing – mobile UI resources (Layout, UI elements, Draw-able, Menu), Activity- states and life cycle, interaction amongst activities.

**App functionality beyond user interface** - Threads, Async task, Services – states and life cycle, Notifications, Broadcast receivers, Telephony and SMS APIs

**SECTION – B**

**Native data handling** – on-device file I/O, shared preferences, mobile databases such as SQLite, and enterprise data access (via Internet/Intranet)

**Testing mobile apps:** Debugging mobile apps, White box testing, Black box testing, and test automation of mobile apps, JUnit for Android, Robotium, MonkeyTalk

**Taking apps to Market:** Versioning, signing and packaging mobile apps, distributing apps on mobile market place

**Recommended Books :**

1. “Programming Android”, G. Blake Meike, Laird Dornin, Masumi Nakamura, and Zigurd Mednieks.
2. “Android Programming for Beginners”, John Horton.
3. “Learning Android”, Marko Gargenta.
4. “The Busy Coder's Guide to Advanced Android Development”, Mark L. Murphy.
5. “Head First Android Development”, Anthony J.F. Griffiths and David Griffiths.

**CPE-310 COMPILER DESIGN**

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 0 | 3.5 |

**Maximum Marks(Internal):50** **Maximum Marks(External):50**

**Minimum Pass Marks(External):40%**

**Course Objectives:**

- To understand the theory and practice of compiler implementation.
- To learn finite state machines and lexical scanning.
- To learn context free grammars, compiler parsing techniques, construction of abstract syntax trees, symbol tables, intermediate machine representations and actual code generation

## SECTION-A

**Introduction To Compiling:**
Compilers – Analysis of the source program – Phases of a compiler – Cousins of the Compiler – Grouping of Phases – Compiler construction tools – Lexical Analysis – Role of Lexical Analyzer – Input Buffering – Specification of Tokens. Cross compiler .Introduction to LEX

**Syntax Analysis And Semantic Analysis:** Role of the parser –Writing Grammars –Context-Free Grammars – Role of Parser and Parse Tree, Top Down parsing – Recursive Descent Parsing – Predictive Parsing – Bottom-up parsing –Handle, Handle Pruning, Shift Reduce Parsing – Operator Precedent Parsing – LR Parsers – SLR Parser – Canonical LR Parser – LALR Parser. Error .Recovery Techniques for different Parsers. Introduction to YACC.

Symbol tables and their data structures. Synthesized and inherited attributes, Construction of syntax trees.

## SECTION-B

**Intermediate Code Generation:** Intermediate languages – Graphical representation, Three-address code, Implementation of three address statements (Quadruples, Triples, Indirect triples).Short Circuit Code , Back patching .

**Code Generation:** Issues in the design of code generator – The target machine – Runtime Storage management — Issues in efficient code generation , instruction costs, register utilization and evaluation order. Basic Blocks and Flow Graphs – Next-use Information A simple Code generator – DAG representation of Basic Blocks – Peephole Optimization.

**Code Optimization And Run Time Environments**: Introduction– Principal Sources of Optimization – Optimization of basic Blocks ,Loop Optimization– Introduction to Global Data Flow Analysis – Runtime Environments – Source Language issues – Storage Organization – Storage Allocation strategies – Access to non-local name Parameter Passing.

**Recommended Books :**

1. Alfred Aho, Ravi Sethi, Jeffrey D Ullman, “Compilers Principles, Techniques and Tools Pearson Education Asia, 2003.
2. Allen I. Holub “Compiler Design in C”, Prentice Hall of India, 2003.
3. C. N. Fischer and R. J. LeBlanc, “Crafting a compiler with C”, Benjamin Cummings, 2003.
4. J.P. Bennet, “Introduction to Compiler Techniques”, Second Edition, Tata McGraw-Hill, 2003.
5. Henk Alblas and Albert Nymeyer, “Practice and Principles of Compiler Building with C”, PHI, 2001.
6. Kenneth C. Louden, “Compiler Construction: Principles and Practice”, Thompson Learning, 2003

**CPE- 311 CLOUD COMPUTING**

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 0 | 3.5 |

**Maximum Marks(Internal):50** **Maximum Marks(External):50**

**Minimum Pass Marks(External):40%**

**Course Objectives:**

- To learn how to use Cloud Services.
- To implement Virtualization
- To implement Task Scheduling algorithms.
- Apply Map-Reduce concept to applications.
- To build Private Cloud.
- Broadly educate to know the impact of engineering on legal and societal issues involved.

**SECTION-A**

**Overview of Computing Paradigm**- Recent trends in Computing: Grid Computing, Cluster Computing, Distributed Computing, Utility Computing, Cloud computing; Evolution of cloud computing Business driver for adopting cloud computing

**Cloud Computing Architecture**- Cloud computing stack: Comparison with traditional computing architecture (client/server), Services provided at various levels, How Cloud Computing Works, Role of Networks in Cloud computing, protocols used, Role of Web services; Service Models (XaaS), Infrastructure as a Service (IaaS), Platform as a Service (PaaS), Software as a Service (SaaS), Deployment Models: Public cloud, Private cloud, Hybrid cloud, Community cloud

**Service Management in Cloud Computing:** Service Level Agreements (SLAs), Billing and Accounting, Comparing Scaling Hardware: Traditional vs. Cloud, Economics of scaling: Benefitting Enormously, Managing Data: Looking at Data, Scalability & Cloud Services, Database & Data Stores in Cloud, Large Scale Data Processing.

**Cloud Security**- Infrastructure Security, Network level security, Host level security, Application level security, Data security and Storage, Data privacy and security Issues, Jurisdictional issues raised by Data location, Identity & Access Management, Access Control, Trust, Reputation, Risk Authentication in cloud computing, Client access in cloud, Cloud contracting Model, Commercial and business considerations

**SECTION-B**

**Introduction to Big Data-** Distributed file system–Big Data and its importance, Four Vs, Drivers for Big data, Big data analytics, Big data applications. Algorithms using map reduce.

**Introduction to Hadoop and Hadoop Architecture**: Data – Apache Hadoop & Hadoop EcoSystem, Moving Data in and out of Hadoop – Understanding inputs and outputs of MapReduce -Data Serialization

**NoSQL-** What is it?, Where It is Used Types of NoSQL databases, Why NoSQL?, Advantages of NoSQL, Use of NoSQL in Industry, SQL vs NoSQL, NewSQL

**Data Base for the Modern Web-** Introduction to MongoDB key features, Core Server tools, MongoDB through the JavaScript's Shell, Creating and Querying through Indexes, Document-Oriented, principles of schema design, Constructing queries on Databases, collections and Documents , MongoDB Query Language.

**Recommended Books**

1. Cloud Computing Bible, Barrie Sosinsky, Wiley-India, 2010
2. Cloud Computing: Principles and Paradigms, Editors: Rajkumar Buyya, James Broberg, Andrzej M. Goscinski, Wiley, 2011
3. Cloud Computing: Principles, Systems and Applications, Editors: Nikos Antonopoulos, Lee Gillam, Springer, 2012
4. Cloud Security: A Comprehensive Guide to Secure Cloud Computing, Ronald L. Krutz, Russell Dean Vines, Wiley-India, 2010
5. Boris lublinsky, Kevin t. Smith, AlexeyYakubovich, "Professional Hadoop Solutions", Wiley, ISBN: 9788126551071, 2015.
6. Chris Eaton,Dirk derooset al. , "Understanding Big data ", McGraw Hill, 2012.
7. BIG Data and Analytics , Sima Acharya, Subhashini Chhellappan, Willey

**CPE-312 MACHINE LEARNING**

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 0 | 3.5 |

**Maximum Marks(Internal):50** **Maximum Marks(External):50**

**Minimum Pass Marks(External):40%**

**Course Objective:**

- Introduce the fundamental problems and applications of machine learning.
- Provide understanding of techniques and mathematical conceptsused in machine learning to facilitate further study in this area.
- Provide understanding to evaluate performance of machine learning algorithms.
- Practice software implementation of different concepts and algorithms covered in the course using PYTHON&SCIKIT-LEARN library.

**SECTION – A**

**Introduction to Pandas:** DataFrame, Data Loading, Extracting rows &columns from dataframe, Broadcasting, Handling Null, missing, duplicate and categorical values.

**Introduction to Machine Learning:** Applications, Challenges, Model Representation, Basic introduction to Scikit-Learn.

**Supervised Learning:** Linear regression (with one variable and multiple variables), Cost Function, Gradient Descent, Polynomial Regression, Decision Trees, Classification (Logistic Regression, Overfitting, Regularization), SVM

**SECTION – B**

**Unsupervised Learning**: K-means Clustering, Hierarchical clustering

**Dimensionality Reduction:** Dimensionality reduction using PCA, Dimensionality reduction using LDA, K-fold cross validation

**Neural Networks:** Multilayer Neural network, Activation Function, Back propagation algorithm, Gradient Checking, Multiclass Classification.

**Recommended Books**

1. William Mckinney, “Python for Data Analysis:Data wrangling with Pandas, NumPy, and Ipython”, 2nd edition, O’Reilly.
2. Aurelien Geron, “Hands-on Machine Learning with Scikit-Learn & TensorFlow”, O’Reilly.
3. Raul Garreta, “Learning scikit-learn: Machine Learning in Python”, Packt.

**CPE-358 RDBMS USING PL/SQL LAB**

| L | T | P | Cr |
|---|---|---|---|
| 0 | 0 | 2 | 1.0 |

**Maximum Marks(Internal):50** **Maximum Marks(External):50**

**Minimum Pass Marks(External):40%**

**LIST OF PRACTICLES**

1. Write a PL/SQL code to print first 50 even numbers. Also insert the list in Temp table. Temp table contains only one column of number data type.
2. Using the conditional controls and case statement in PL/SQL, execute the following queries:
    a. Calculate the average salary from table 'Employee' and print"Increase the salary" if the average salary is less than Rs. 10,000.
    b. Print the deptno from the 'Employee' table using the case statement; if the deptname is 'Technical' then deptno is 1, if the deptname is 'HR' then the deptno is 2 else deptno is 3.
3. Write a PL/SQL code to insert all the details of employee no. 7698 to a new table which has same structure as emp table.
4. Write a PL/SQL code to update the commission of the employee number 7369 to Rs. 300, if it is null; else raise his commission by 25%.
5. Declare records to hold employee detail and department information. Write a program that displays total salary including commission of empno 7369. It should also display employee name, his department details and his old and new salary.
6. Write a PL/SQL code to load the employee names and salaries into PL/SQL table and then display the contents of the table.
7. Using cursors display the details of all those employees from EMP table whose sum of salary and commission is more than Rs. 3000.
8. Create a procedure by the name INCR to increase the salary of an employee. The employee number and the amount to be incremented is passed as parameters.
9. Write a user defined function TCASE to display all the employee names in title case. Execute a SQL statement using the function TCASE to show the employee name and job.
10. Write a trigger total_salary to maintain a derived column totsal that stores the total salary of all members in a department.
11. Create an INSTEAD_OF trigger on view V1 which contains columns DNAME, ENAME and SALARY from tables Dept and Emp joined on the basis of DEPTNO. If salary on an Employee is updated in the view, it should be updated in the EMP table.
12. Write a PL/SQL program (which includes declaration section, executable section and exception handling section) such that:
    a) Student marks can be selected from the table and printed for those who secured first class and an exception can be raised if no records were found.
    b) Insert data into student table and use COMMIT, ROLLBACK and SAVEPOINT in PL/SQL block.

**CPE-359 MOBILE APPS DEVELOPMENT LAB**

| L | T | P | Cr |
|---|---|---|---|
| 0 | 0 | 2 | 1.0 |

**Total Marks:100**

**LIST OF PRACTICALS**

1) Create an application that display "Hello word".

2) Create an application using the concept of "Screen Orientation".

3) Create an application using Date Picker UI Widget.

4) Create an application with the use of Button.

5) Developing an application with the use of ProgressBar.

6) Create an application with the use of Intents.

7) Developing an application with the use of RadioButton.

8) Developing an application with the use of CheckBoxes.

9) Creation of Option Menus in application.

10) Developing an application with the use of Fragments.

11) Developing an application with the use of Telephony Services.

12) Use of Web View during the creation of application.

**CPE-362 MACHINE LEARNING LAB**

| L | T | P | Cr |
|---|---|---|---|
| 0 | 0 | 2 | 1.0 |

**Total Marks:100**

**LIST OF PRACTICALS**

1. Write a program to extract a subset of data from a dataframe.
2. Write a program to handle missing values and duplicate values.
3. Write a program to handle categorical data.
4. Write a program to create a cross validation set.
5. Write a program for simple and multiple linear regression.
6. Write a program for logistic regression to perform classification of the data.
7. Write a program to reduce the number of features using the dimensionality reduction technique.
8. Write a program to compare the performance between using the complete feature set and the reduced feature set on the same set of data.

**HSS – 351** **COMMUNICATION SKILLS LAB**

| L | T | P | Cr |
|---|---|---|---|
| 0 | 0 | 2 | 1.0 |

**Total Marks:100**

**LIST OF PRACTICALS**

1. Recognizing and articulating speech sounds, mock dialogue/conversation.
2. Making an oral presentation, class seminars, paper reading.
3. Participating in a group discussion.
4. Holding a mock meeting.
5. Developing skills related to Business Corrospondence
6. Preparation for participating in a mock interview for a job etc.
7. Developing skills for conducting a meeting; attending telephonic calls.
8. Listening to a recorded conversation and reviewing/discussing its contents and style.

**CPE – 314 INTERNET OF THINGS**

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 0 | 3.5 |

**Maximum Marks(Internal):50** **Maximum Marks(External):50**

**Minimum Pass Marks(External):40%**

**Course Objectives:**

- Able to understand the application areas of IoT
- Able to realize the revolution of Internet in Mobile Devices, Cloud & Sensor Networks
- Able to understand building blocks of Internet of Things and characteristics.

## SECTION-A

**Introduction & Concepts:** Introduction to Internet of Things, Physical Design of IoT, Logical Design of IoT, IoT Enabling Technologies, IoT Levels.

**M2M to IoT:** The Vision-Introduction, From M2M to IoT, M2M towards IoT-the global context, A use case example, Differing Characteristics. A Market Perspective- Introduction, Some Definitions, M2M Value Chains, IoT Value Chains, An emerging industrial structure for IoT, The international driven global value chain and global information monopolies.
**M2M and IoT Technology Fundamentals**: Devices and gateways, Local and wide area networking, Data management, Business processes in IoT, Everything as a Service(XaaS), M2M and IoT Analytics, Knowledge Management
**IoT Architecture:** State of the Art - Introduction, State of the art
**IoT Reference Architecture:** Introduction, Functional View, Information View, Deployment and Operational View, Other Relevant architectural views.

## SECTION-B

**Domain Specific IoTs:** Home Automation, Cities, Environment, Energy, Retail, Logistics, Agriculture, Industry, Health & Life Style.

**Industrial Automation:** Service-oriented architecture-based device integration, SOCRADES: realizing the enterprise integrated Web of Things, IMC-AESOP: from the Web of Things to the Cloud of Things

**IoT Physical Devices & Endpoints:** What is an IoT Device, Exemplary Device, Board, Linux on Raspberry Pi, Interfaces, and Programming & IoT Devices.

**References:**

1. Vijay Madisetti, Arshdeep Bahga," Internet of Things A Hands-On- Approach",2014
2. Adrian McEwen, "Designing the Internet of Things", Wiley Publishers, 2013
3. Daniel Kellmereit, "The Silent Intelligence: The Internet of Things". 2013

**CPE-316 EMBEDDED SYSTEM**

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 0 | 3.5 |

**Maximum Marks(Internal):50** **Maximum Marks(External):50**

**Minimum Pass Marks(External):40%**

**Course Objectives:**

- To have knowledge about the basic working of a microcontroller system and its programming in assembly language.
- To provide experience to integrate hardware and software for microcontroller applications systems.

## SECTION-A

Introduction to Embedded Systems Definition of Embedded System, Embedded Systems Vs General Computing Systems, History of Embedded Systems, Classification, Major Application Areas, Purpose of Embedded Systems, Characteristics and Quality Attributes of Embedded Systems.

Arm Processor Architecture : Architecture, Registers, Interrupts & Vector Table, I/O Ports, ARM Processor family, JTAG, I2C bus

## SECTION-B

Arm Programming Instructions: Instruction Set: Data processing instructions, Addressing modes, Load Store Instructions, PSR (Program Status Register) Instructions, Conditional Instructions, Interrupt Instructions

Real World Interfacing: LCD, ADC and sensors, stepper motor, keyboard, DAC and external memory. Introduction

**Recommended Books:**

1. Embedded System Design by Frank Vahid and Tony Givargus.
2. Andrew N. Sloss, Dominic Symes, Chris Wright, John Rayfield, ―ARM System Developer's Guide Designing and Optimizing System Software‖, Elsevier 2008. 2.
3. Brooks, Cole, ―Embedded Microcontroller Systems, Real Time Interfacing‖, Thomson Learning 1999
4. Steve Furber, ―ARM system on Chip Architecture‖, Addision Wesley
5. Website www.arm.com

CPE-317 **BIOMETRIC SECURITY**

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 0 | 3.5 |

**Maximum Marks(Internal):50** **Maximum Marks(External):50**

**Minimum Pass Marks(External):40%**

**Course Objectives:**

- To understand the fundamentals of biometric security.
- To develop an understanding of fundamental component common to all biometric systems.
- To acquire knowledge on standard algorithms and protocols related to biometric security.
- To understand the application in the field of biometric system.

**Section-A**

**Biometrics Introduction:** Benefits of biometrics over traditional authentication system, benefits of biometrics in identification system, comparison of various biometric traits, selecting a biometric for a system, Applications. Key biometrics terms and processes, biometric verification and identification, how biometric matching works. Accuracy in biometric systems.

**Attacks in biometric:** Adversary attacks, attacks at the user interface, attacks on the biometric processing, attacks on template database, spoofing and mimicry attacks.

**Physiological biometric technologies and authentication protocols:** (fingerprints, facial scan, Iris scan, Hand scan): Technical description, characteristics, weaknesses and deployment. Biometrics based secure cryptograph protocols, biometric based cryptographic key regeneration and sharing, biometric based session key generation and sharing protocol, performance evaluation strategies.

**Section-B**

**Biometric data protection:** biometric data, concept of personal data, data protection and privacy, security criteria for biometric system, adoption of security, revocation procedures, security and organizational aspects of biometric system.

**Multi-biometrics:** basic concept of multi modal biometric system, advantages of multimodal over unimodal biometric systems, multimodal fusion techniques.

**Biometric applications**: identification cards, biometrics on smart cards, overview of local and global structure, mechanism for on card comparison, off card and on card alignment, smart textile sensors, bio signals, biometrics and intelligence services.

**Recommended books:**

1. Anil K. Jain, Michigan State University, USA, Patrick Flynn University of Notre Dame, USA, Arun A. Ross West Virginia University, USA , “Handbook of Biometrics.
2. David Check Ling Ngo,Andrew Beng Jin Teoh,Jiankun Hu "Biometric Security" Cambridge Scholars,2015
3. Els. J.Kindt, ―Privacy and data protection issues of Biometric Applications ―, Springer,2013.
4. Biometrics for Network Security, By Paul Reid, Pearson
5. James wayman, ―Introduction to Biometrics‖, Springer 2011
6. Biometrics: Concepts and Applications By G.R. Sinha, Sandeep Patil, Wiley

**MBA 5012 FOUNDATIONS OF MANAGERIAL ACCOUNTING**

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 0 | 3.5 |

**Maximum Marks(Internal):50** **Maximum Marks(External):50**

**Minimum Pass Marks(External):40%**

Management Accounting and Cost Concepts. Investing Activities: Nature of Long-Lived Assets, Depreciation methods. Long-term Liabilities. Equity Financing: Nature of equities, Accounting for Equities, Retained Earnings. Investments in Debt and Equity Securities: Trading Securities, Available-for-sale Securities, Held-to-maturity securities. Statement of Cash Flows: Purpose, Classification. Financial Statement Analysis: Ratios, Common-Size Financial Statements. Activity-Based Costing. Cost Behavior and Decisions using C-V-P analysis: Importance of C-V-P, Analysis of Mixed costs, Methods of C-V-P analysis. Capital Investment Decisions: Nondiscounted Capital Budgeting Techniques, Discounted Capital Budgeting Techniques.

**Recommended Books:**

1. Charles T. Horngren, George Foster and Srikant M. Datra, *Cost Accounting: A Managerial Emphasis*, Prentice-Hall of India, New Delhi, 12th Edition.
2. Charles T. Horngren, *Introduction to Management Accounting*, Prentice-Hall of India, New Delhi, 12th Edition, 2007.

**OPEN ELECTIVE: ESSENTIALS OF COMPUTERS**

| L | T | P | Cr |
|---|---|---|---|
| 3 | 0 | 0 | 0.0 |

**Maximum Marks(Internal):50** **Maximum Marks(External):50**

**Minimum Pass Marks(External):40%**

**Objectives:** Thorough understanding of Computer Basics and Information Technology.

## SECTION A

**Introduction to computer:** Characteristics of computers, Basic applications of computer, Components of computer system, Classifications of computers, Concepts of hardware/software, data/Information, basic data types, and storage of data/Information as files.

**Introduction to windows:** Basics of operating system, User interface: Using Mouse and moving icons on the screen, Recycle bin, Viewing of file, Folders and Directories, Creating and Renaming of files and folders. Windows Setting: Control panels, Wall paper and Screen savers, Setting the date and sound. Advanced Windows: Basics of Window setup, Creating short cuts, Notepad.

**Elements of Word Processing:** An Introduction to Word processing, Opening and closing documents, Using the Page setup, Menu bar and Help option, Printing of documents, Display/Hiding of paragraph marks and inter word space, Scrolling, Text creation and manipulation, Formatting the text, Handling multiple documents, Table manipulation.

## SECTION B

**Spread Sheet:** Elements of Electronics Spread Sheet, Manipulation of cells, Providing Formulas, Spread sheets for Small accountings.

**Computer Communication and Internet:** Basic of Computer networks, Internet, Service on Inter Net: WWW and web-sites, Electronic mails, Communication on Internet.

**WWW and Web Browsers:** Web browsing software, Surfing the Internet, Chatting on Internet.

**Email:** Basic of electronic mail, Using e-mails, Document handling.

**Making Presentations:** Basics, Creation of presentation, Preparation of slides, Providing aesthetics, Slide manipulation and Slide show, Presentation of the slides.

**Reference Books:**

1. Guy Hart-Davis "The ABCs of Microsoft Office Professional edition", BPB Publications,
2. P.K Sinha `Computer Fundamentals`, BPB Publications, 1992.

**B. TECH FOURTH YEAR**
**COMPUTER SCIENCE & ENGINEERING**

**(Batch 2020)**
**Session (2023-24)**
**SCHEME OF PAPERS**

**SEVENTH SEMESTER (COMPUTER SCIENCE & ENGINEERING)**

| S. No. | Subject Code | Subject Name | L | T | P | Cr. |
|---|---|---|---|---|---|---|
| 1. | CPE-401 | Computer Crime Investigation and Forensics | 3 | 1 | 0 | 3.5 |
| 2. | CPE-402 | Data Mining & Warehousing | 3 | 1 | 0 | 3.5 |
| 3. | CPE-403 | Natural Language Processing | 3 | 1 | 0 | 3.5 |
| 4. | CPE-405 | Soft Computing | 3 | 1 | 0 | 3.5 |
| 5. | | Elective- IV* | 3 | 0 | 0 | 3.0 |
| 6. | CPE-450 | Major Project | 0 | 0 | 4 | 2.0 |
| 7. | CPE-451 | Computer Crime investigation and Forensics Lab | 0 | 0 | 2 | 1.0 |
| 8. | CPE-452 | Data Mining & Warehousing Lab | 0 | 0 | 2 | 1.0 |
| **Total** | | | **15** | **4** | **8** | **21** |
| **Total Contact Hours = 29** | | | | | | |

**ELECTIVE SUBJECTS – IV***

| S. No. | Subject Code | Subject Name | L | T | P | Cr. |
|---|---|---|---|---|---|---|
| 1. | CPE-407 | E-Commerce | 3 | 0 | 0 | 3.0 |
| 2. | CPE-408 | System Simulation & Modeling | 3 | 0 | 0 | 3.0 |
| 3. | CPE-409 | Parallel Processing | 3 | 0 | 0 | 3.0 |
| 4. | MBA-5013 | Foundation of Finance | 3 | 0 | 0 | 3.0 |
| 5. | MBA-5033 | Foundation of International Business | 3 | 0 | 0 | 3.0 |

***Choose any one from the list OR Elective under Massive Open Online Courses (MOOCS) available on SWAYAM platform of Govt. of India offered through online mode. The subjects which students can opt from MOOCS will be notified by the department semester wise time to time**

CPE-450, CPE-451 and CPE-452 are practical papers only. There will not be any theory examination for these papers.

## Department of Computer Science & Engineering

Punjabi University, Patiala.

## General Instructions to the Paper Setters

(Common for B.Tech. in Computer Science & Engineering, Electronics and Communication Engineering, Mechanical Engineering, Civil Engineering and Integrated B.Tech/MBA Branches)

**Pattern of Question Paper**

TITLE OF SUBJECT (CODE----)

Bachelor of Technology (Branch) Section: ……..

End Semester Exam

TIME ALLOWED: 3 Hour Roll. No…….

Maximum Marks: 50

Pass Marks : 20

Note:- Section C is compulsory. Attempt any six questions selection three questions from each section A & B.

**Section-A (From Section A of the syllabus)**

Q1. .....

Q2. .....

Q3. .....

Q4. ..... 3x5

Q5……..

**Section-B (From Section B of the syllabus)**

Q6. .....

Q7. .....

Q8. .....

Q9. ..... 3x5

Q10…….

**Section-C (From whole syllabus)**

Q11

a).....

b).....

c).....

d).....

e).....

f).....

g).....

h).....

i).....

j)……. 10x2=20

***Note for the paper setter:***

1. Total numbers of questions to be set are Eleven (11) as per the above format.
2. There will be five questions in each of the Sections A and B. Each question will be of five (05) marks. However, a question may be segregated into subparts. Candidates will be required to attempt SIX questions by selecting three Questions from each Sections A & B.
3. Section C is compulsory and contains ten (10) sub-parts each of two (2) marks.
4. The maximum limit on numerical problems to be set in the paper is 35%.
5. The paper setter shall provide detailed marking instructions and solutions to numerical problems for evaluation purpose in the separate white envelopes provided for solutions.
6. The paper setters should seal the internal & external envelope properly with signatures & cello tape at proper place.
7. Log tables, charts, graphs, Design data tables etc. should be specified, whenever needed.
8. Use of Scientific calculator should be clearly specified.

**CPE-401 COMPUTER CRIME INVESTIGATION AND FORENSICS**

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 0 | 3.5 |

**Maximum Marks(Internal):50** **Maximum Marks(External):50**

**Minimum Pass Marks(External):40%**

**Course Objectives:**

The objective of this course is to emphasize on the fundamentals and importance of cyber laws and digital forensics. Students will learn different techniques and procedures that enable them to perform a digital investigation. This course focuses mainly on the analysis of physical storage media and volume analysis. It covers the major phases of digital investigation such as preservation, analysis and acquisition of artifacts that reside in hard disks and random access memory.

**SECTION-A**

Evolution of computer Technology, emergence of cyber space. Introduction in Cyber law, Components of Cyber Law and Jurisprudence, Cyber Space and Netizen, Approaches for cybercrime investigation, Cyber evidence, Cyber Ethics, Cyber Terror, Child pornography and related crimes, Obscenity on Internet

Cyber Law in India: An Overview of Information Technology Act, 2000, Grey Areas of Information Technology Act, 2000, Amendments of IT ACT, 2000, Digital Signature, Responsibilities of Internet Service Provider (ISP) / Network Service Provider (NSP), Laws related to Intellectual Property Rights.

**SECTION-B**

Digital Forensics: history and challenges, Type of Digital Forensics, Forensic Psychology and Criminal Profiling for cybercrimes, Overview of operating systems: registry, boot process, file systems, file metadata, hashing, Current Tools of Computer Forensics & Data recovery

Network Forensics: Tracing IP addresses and e-mail header investigations, Malware, Detection of DOS/DDoS attacks, Botnets, Identity Theft, SPAM

Image Forensics: History of Digital Image Forgery, Types of Digital Image Forgery attacks, Classification of digital image forgery detection techniques, Localization of image forgery

Case Study: Cyber Crimes in India

Reference Books:

1. Computer Forensics and Cyber Crime: An Introduction (3rd Edition) byMarjie T. Britz
2. The Information Technology Act, 2000, as Notified by Govt. of India
3. NetworkForensics:TrackingHackers through Cyberspace,SherriDavidoff,Jonathan Ham Prentice Hall
4. Criminal Psychology and Forensic Technology A Collaborative Approach to Effective Profiling, CRC Press

**CPE-402 DATA MINING & WAREHOUSING**

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 0 | 3.5 |

**Maximum Marks(Internal):50** **Maximum Marks(External):50**

**Minimum Pass Marks(External):40%**

**Course Objectives:**

To introduce students to the basic concepts and techniques of Data Mining

- To develop skills of using recent data mining software for solving practical problems.
- To gain experience of doing independent study and research.
- To study the methodology of engineering legacy databases for data warehousing and datamining to derive business rules for decision support systems.
- Develop and apply critical thinking, problem-solving, and decision-making skills.
- Develop and apply enthusiasm for learning. Class participation is encouraged in this course Enriching.

**SECTION-A**

**Introduction**: Introduction to RDBMS, data warehouse, transactional databases, data miningfunctionalities, classification of data mining system, major issues in data mining.

**Data Pre-processing**: Data Cleaning, Data Integration and Transformation, Data Reduction,Discretization and Concept Hierarchy Generation

**Data Warehouse and OLAP**: Basic concepts in data warehousing, Collectingthe requirements of data warehouse, Data Warehouse Architecture,Design, Implementation & Maintenance, OLAP in data warehouse,Data warehousing and the web, Data Cube Technology, From DataWarehousing to Data Mining.

**Introduction to Data Mining:** Basics of data mining, Data mining techniques, KDP (KnowledgeDiscovery Process), Application and Challenges of Data Mining, Security Issue, Privacy Issue.

**SECTION-B**

**Mining Association Rules in Large Databases:** Association Rule Mining, Association RuleMining, Mining Single Dimensional Boolean Association Rules fromTransactional Databases, Mining Multilevel Association Rules fromTransaction Databases, Mining Multidimensional Association Rules fromRelational Databases and Data Warehouses, From Association Miningto Correlation Analysis, Constraint Based Association Mining.

**Classification and Prediction:** Issues Regarding Classificationand Prediction, Classification by Decision Tree Induction, BayesianClassification, Classification by Back propagation, ClassificationBased on Concepts from Association Rule Mining, Classifier Accuracy, Prediction: linear &nonlinear regression.

**Cluster Analysis in Data Mining:** Types of Data in Cluster Analysis.A Categorization of Major Clustering Methods, Partitioning Methods,Density Based Methods, Grid Based Methods; Model Based ClusteringMethods, Outlier Analysis.

**Introduction to Mining Complex Types of Data**: Complex data objects, Mining spatial databases,Multimedia databases, Time Series and sequence databases, Text databases and World Wide Web. Applications of data mining.

**BOOKS RECOMMENDED**

1. Jiawei Han and MichelineKamber, “Data Mining: Concepts and Techniques”, MorganKaufmann Publishers, 2000 (ISBN: 1-55860-489-8).

2. Ian H. Witten and Eibe Frank, “Data Mining: Practical Machine Learning Tools and Techniqueswith Java implementations”, Morgan Kaufmann Publishers, San Fransisco, CA (2000).

3. Dorian Pyle, “Data Preparation for Data Mining”, Morgan Kaufmann, (1999)

4. Korth, Silbertz, Sudarshan, “Database Concepts”, McGraw Hill

5. Elmasri, Navathe, “Fundamentals Of Database Systems”, Addision Wesley

**CPE-403 NATURAL LANGUAGE PROCESSING**

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 0 | 3.5 |

**Maximum Marks(Internal):50** **Maximum Marks(External):50**

**Minimum Pass Marks(External):40%**

**Course Objective:**

To understand the basic concepts of Natural Language Processing (NLP). The student must be able to apply the various concepts of NLP in other application areas.

**SECTION – A**

**Introduction :** Origins and challenges of NLP-Language and Grammar-Processing Indian Languages-NLP Applications-Information Retrieval. Introduction-Various Grammar-based Language Models-Statistical Language Model.

**Word level and syntactic analysis:** Introduction- Regular Expressions-Finite-State Automata-Morphological Parsing-Spelling Error Detection and correction-Words and Word classes -Part-of Speech Tagging. Introduction-Context-free Grammar-Constituency Parsing-Probabilistic Parsing.

**SECTION – B**

**Semantic analysis and discourse processing: semantic analysis:** Introduction- Meaning Representation-Lexical Semantics Ambiguity-Word Sense Disambiguation. Introduction- cohesion-Reference Resolution Discourse Coherence and Structure.

**Natural language generation and machine translation:** Introduction-Architecture of NLG Systems Generation Tasks and Representations-Application of NLG. Introduction-Problems in Machine Translation Characteristics of Indian Languages- Machine Translation Approaches-Translation involving Indian Languages.

**Recommended Books:**

1. James A., Natural language Understanding 2e, Pearson Education, 1994

2. Bharati A., Sangal R., Chaitanya V.. Natural language processing: a Paninian perspective, PHI, 2000

3. Siddiqui T., Tiwary U. S.. Natural language processing and Information retrieval, OUP, 2008

**CPE-405 SOFT COMPUTING**

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 0 | 3.5 |

**Maximum Marks(Internal):50** **Maximum Marks(External):50**

**Minimum Pass Marks(External):40%**

**Course Objective:**

- It deals with Introduction and different architectures of neural network
- It deals with the Application of Neural Networks
- It deals with Genetic Algorithms and Hybrid Systems

## SECTION – A

**Introduction to Soft Computing:** Concept of computing systems, "Soft" computing versus "Hard" computing. Characteristics of Soft computing, Some applications of Soft computing techniques

**Fuzzy logic :** Introduction to Fuzzy logic, Fuzzy sets and membership functions, Operations on Fuzzy sets, Fuzzy relations, rules, implications and inferences. Some applications of Fuzzy logic, Defuzzification.

**Introduction To Neural Networks**: Structure and working of Biological Neural Network, Fundamentals of Artificial Neural Networks, Characteristics of Artificial Neural Networks, Applications of ANNs to solve some real life problems.

**Neural Network Models:** Single layer perception, Multilayer Perception, Supervised and Unsupervised learning - Backpropagation networks, Kohnen's self organizing networks, Hopfield network, Learning Vector Quantization , Hebbian Learning.

## SECTION – B

**Genetic Algorithms:** Overview, GA operators: Encoding, Crossover, Selection, Mutation, etc, Problem solving using GA and GP , Implementation of GA and GP

**Neuro-Fuzzy Systems-** Introduction, Architecture of a Neuro-Fuzzy system and its applications

**Machine Learning:** Supervised learning: Primitive algorithms, Generative algorithms, Support Vector Machine, Ensemble methods. Unsupervised learning: K-means.

**Applications:** Applications of GA & GP, Hybrid systems

**References Book:**

1. Timothy J.Ross, “Fuzzy Logic with Engineering Applications”, McGraw-Hil.
2. Davis E.Goldberg, “Genetic Algorithms: Search, Optimization and Machine Learning”, Addison Wesley, N.Y..
3. S. Rajasekaran and G.A.V.Pai, “Neural Networks, Fuzzy Logic and Genetic Algorithms”, PHI.
4. James Freeman A. and David Skapura M, “Neural Networks - Algorithms, Applications & Programming Techniques” Addison Wesley.
5. Yegnanarayana B , “Artificial Neural Networks”, Prentice Hall of India Private Ltd., New Delhi.

**CPE-450 MAJOR PROJECT**

| L | T | P | Cr |
|---|---|---|---|
| 0 | 0 | 4 | 2.0 |

**Total Marks:100**

**Objectives**: Development of practical skills based on programming languages and environments studied in the curriculum.

Each student will be required to undertake project work and implement it using programming languages and environments studied in the curriculum, like C, C++, Java, Android, VB.Net, Python, PL/SQL etc. Students have to report their progress to the allotted supervisors regularly. Students may form teams for project work. The student team members must highlight their role and/or contributions at the time of project evaluation. The marks distribution for the major project work will be according to the following guidelines:

| | |
|---|---|
| Demonstration of Project | 50% of the marks |
| Presentation and Viva Voce | 25% of the marks |
| Project Report Document | 15% of the marks |
| Source Code | 10% of the marks |

**CPE-451 COMPUTER CRIME INVESTIGATION AND FORENSICS LAB**

| L | T | P | Cr |
|---|---|---|---|
| 0 | 0 | 2 | 1.0 |

**Total Marks:100**

## LIST OF PRACTICALS

1. Open Source Tools for forensic investigation process model
2. Forensic Toolkit (FTK)
3. Sleuth Toolkit (TSK)
4. Autopsy
5. Image Forensic Tools (Ghiro, Fotoforensics etc.)
6. Tools of data recovery
7. SANS Investigative Forensic Toolkit (SIFT)
8. Mobile Forensic Analysis and Data Extraction Tools

**CPE-452 DATA MINING & WAREHOUSING LAB**

| L | T | P | Cr |
|---|---|---|---|
| 0 | 0 | 2 | 1.0 |

**Total Marks:100**

## LIST OF PRACTICALS

1. Introduction to Data Mining Tools and its installation.
2. Exploring Data Mining Tool.
3. Understanding files formats supported by the tool.
4. Demonstration of preprocessing.
5. Demonstration of Association rule process on dataset using apriori algorithm.
6. Demonstration of classification rule process on dataset using id3 algorithm.
7. Demonstration of clustering rule process on dataset using simple k-means.

**CPE-407 E-COMMERCE**

| L | T | P | Cr |
|---|---|---|---|
| 3 | 0 | 0 | 3.0 |

**Maximum Marks(Internal):50** **Maximum Marks(External):50**

**Minimum Pass Marks(External):40%**

**Course Objectives:**

- To introduce the concept of electronic commerce, and to understand how electronic commerce is affecting business enterprises, governments, consumers and people in general. In addition, we will study the development of websites using relevant software tools.
- Acquaint students with a fundamental understanding of the environment and strategies in the New Economy.
- Provide a fundamental understanding of the different types and key components on business models in the New Economy.
- Provide guiding principles behind the design and strategy of the customer web interface.
- Understand the traditional and new communication/marketing approaches that create competitive advantage in the New Economy.
- Provide insights on how to implement strategy in the New Economy.

**SECTION-A**

Introduction: Definition of Electronic Commerce, E-Commerce: technology and prospects, incentives for engaging in electronic commerce, needs of E-Commerce, advantages and disadvantages, framework, Electronic commerce and Electronic Business( C2C) (2G , G2G , B2G , B2P ,B2A,P2P,B2A,C2A,B2B,B2C), Impact of E-commerce on business, E-Commerce Models.

Network Infrastructure for E- Commerce: Internet and Intranet based E-commerce- Issues, problems and prospects, Network Infrastructure, Network Access Equipments, Broadband telecommunication (ATM, ISDN, FRAME RELAY). Building own website :Reasons for building own website, Benefits of website, Cost , Time , Reach, Registering a Domain Name, Web promotion, Target email , Banner Exchange , Shopping Bots.

**SECTION-B**

Mobile Commerce: Introduction to Mobile Commerce, Mobile Computing Application, Wireless Application Protocols, WAP Technology, Mobile Information Devices, Web Security. Introduction to Web security, Firewalls & Transaction Security, Client Server Network, Emerging Client Server Security Threats, firewalls & Network Security.

Electronic payment System, Introduction, Types of Electronic payment system, Payment types, Traditional payment, Value exchange system, Credit card system, Electronic funds transfer, Paperless bill, Modern payment cash, Electronic cash , online Banking. EDI Application in business, E-Commerce Law, Forms of Agreement, Govt. policies and Agenda.

Internet Marketing: The PROS and CONS of online shopping, The cons of online shopping, Internet marketing techniques, The E-cycle of Internet marketing, Personalization e – Commerce- Governance for India E- Governance of India, Indian customer EDI system, Service centre, Imports, Exports.

**References:**

1. Ravi Kalakota, Andrew Winston, “Frontiers of Electronic Commerce”, Addison- Wesley.
2. Pete Lohsin , John Vacca “Electronic Commerce”, New Age International
3. Goel, Ritendra “E-commerce”, New Age International
4. Laudon, “E-Commerce: Business, Technology, Society”, Pearson Education
5. Bajaj and Nag, “E-Commerce the cutting edge of Business”, TMH
6. Turban, “Electronic Commerce 2004: A Managerial Perspective”, Pearson Education

**CPE – 408 SYSTEM SIMULATION & MODELING**

| L | T | P | Cr |
|---|---|---|---|
| 3 | 0 | 0 | 3.0 |

**Maximum Marks(Internal):50** **Maximum Marks(External):50**

**Minimum Pass Marks(External):40%**

**Course Objectives:**

- To the simulation and modeling techniques
- Provide students with opportunities to develop basic simulation and modeling skills with respect to carrying out research projects using any simulation method on the computer.

**SECTION – A**

**Introduction:** Systems, modeling, general systems theory, Concept of simulation, Simulation as a decision making tool, types of simulation. Simulation Terminologies- Application areas – Model Classification –Types of Simulation- Steps in a Simulation study- Concepts in Discrete Event Simulation - Simulation Examples.

**Statistical Models – Concepts: –** Discrete Distribution- Continuous Distribution – Poisson Process- Empirical Distributions- Queueing Models – Characteristics- Notation – Queueing Systems – Markovian Models- Properties of random numbers- Generation of Pseudo Random numbers- Techniques for generating random numbers-Testing random number generators- Generating Random-Variates- Inverse Transform technique – Acceptance- Rejection technique – Composition & Convolution Method.

**SECTION-B**

**Design of Simulation Experiments:** Problem formulation, data collection and reduction, time flow mechanism, key variables, logic flow chart, starting condition, run size, experimental design consideration, output analysis and interpretation validation, input modeling, Data collection, Assessing sample independence, Hypothesizing distribution family with data, Parameter Estimation, Goodness-of-fit tests, Selecting input models in absence of data, Output analysis for a Single system, Terminating Simulations, Steady state simulations.

Development of simulation models using simulation language studied for systems like queuing systems, Production systems, Inventory systems, maintenance and replacement systems and Investment analysis. Simulation Tools – Model Input, High level computer system simulation, CPU –Memory Simulation, Comparison of systems via simulation – Simulation Programming techniques - Development of Simulation models. Simulation programming languages – simulation suitability with characteristics, Comparison and selection of simulation languages, study of any one simulation language.

**Recommended Books:**

1. Jerry Banks and John Carson, " Discrete Event System Simulation", Fourth Edition, PHI, 2005.
2. Geoffrey Gordon, "System Simulation", Second Edition, PHI, 2006.
3. Narsingh Deo, "System Simulation with Digital Computer, "Prentice Hall, India, 2001.
4. Frank L. Severance, " System Modeling and Simulation", Wiley, 2001.
5. Jerry Banks, "Handbook of Simulation: Principles, Methodology, Advances, Applications and Practice", Wiley, 1998.

**CPE-409** **Parallel Processing**

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 0 | 3.5 |

**Maximum Marks(Internal):50**
**MaximumMarks(External):50**

**Minimum Pass Marks(External):40%**

**Course Objectives:**

- To understand the concepts of parallel processing and basic parallel programming techniques.
- To develop an understanding of fundamental concepts of Scheduling ,Barriers and Race conditions.
- To acquire knowledge on Threads and their implementation.
- To understand the algorithms for parallel machines.

**Introduction:** Parallel Processing ,shared Memory Multiprocessing, Distributed Shared memory, Message passing Parallel Computers, Processes, Shared memory Programming, General model of Shared Memory Programming ,Forking-creating Processes, Joining Processes, Process Model under UNIX

**Basic parallel programming techniques: –**Loop Splitting, Ideal Speedup, Spin locks, Contention and Self Scheduling

**Scheduling**: Loop Scheduling, Self Scheduling, Indirect Scheduling , Block Scheduling

**SECTION-B**

**Barriers and Race Condition:** The Barrier calls-Expression Splitting.

**Thread-Based Implementation**: Thread Management, The POSIX Thread Application Programmer Interface, Synchronization Primitives in POSIX, Example with Threads ,Attributes of Threads, Mutual Exclusion with Threads, Mutex usage of Threads, Thread Implementation, Events and Condition Variables**.**

**Algorithms of Parallel Machines: M**odels of Computation, Analysis Of Parallel Algorithms, Prefix Computation, Histogram Computation, Parallel Reduction, Sorting Networks, Matrix Multiplication

**Recommended books:**

1.Introduction To Parallel Programming - By Steven Brawer.
2. Introduction to Parallel Computing, Ananth Grama, Anshul Gupta, George Karypis, Vipin Kumar, By Pearson Publication.
3. Introduction To Parallel Processing – By M.Sasikumar, Dinesh Shikhare And P. Ravi Prakash.

**MBA 5013 FOUNDATIONS OF FINANCE**

| L | T | P | Cr |
|---|---|---|---|
| 3 | 0 | 0 | 3.0 |

**Maximum Marks(Internal):50** **Maximum Marks(External):50**

**Minimum Pass Marks(External):40%**

**Course Objectives:**
The main goal of this course is to develop a foundation of financial management concepts. This will enable the student to understand how corporations make important investment and financing decisions, and how they establish investment policies. This course in finance describes the corporation and its operating environment; it will help any future manager to understand how the finances of a company work, and how they will be interfacing with finance

**SECTION-A**

Financial Management: Meaning and nature; Financial goal–profit vs. wealth maximization; Finance functions–investment, financing, liquidity and dividend decisions. Sources of Finance: long and short term. Capital Structure Theories: Conceptual framework. Net income approach, Net operating income approach, Intermediary approach and M.M. Hypotheses. Leverage: Operating and Financial and combined. Management of Working Capital: Meaning, significance and types of working capital; sources of working capital

**SECTION-B**

Capital Budgeting-process, importance, Basic Principles in Estimating Cost and Benefits of Investments -Appraisal Criteria: Discounted and Non-Discounted Methods (Pay-Back Period - Average rate of return - Net Present Value -Benefit Cost Ratio - Internal Rate of Return).Capital rationing. . Capital Structure Theories: Net Income Approach - Net Operating Income Approach - Traditional Approach - Modigliani-Miller Model (MM), Miller. Dividend Policies: Issues in dividend decisions; Theories of relevance and irrelevance of dividends; Bonus Shares.

**RECOMMENDEDBOOKS:**

1. Van Horne., “Financial Management & Policy”, Pearson Education.
2. Chandra, P., “Financial Management”, Tata McGraw–Hill
3. Pandey, I.M., “Financial Management”,Vikas Publishing House.
4. J.J. Hamton, Financial Decision Making: Concepts, Problems and Cases, Prentice-Hall of India, New Delhi, 4th Edition.
5. Khan and Jain, Financial Management, Tata McGraw-Hill Publishing Co. Ltd., New Delhi, 4th Edition.
6. Stephan A. Ross, Randolph W. Waterfield and Jeffery Jaffe, Corporate Finance, Tata McGraw-Hill Publishing Co. Ltd., New Delhi, 7th Edition.

**MBA 5033 FOUNDATIONS OF INTERNATIONAL BUSINESS**

| L | T | P | Cr |
|---|---|---|---|
| 3 | 0 | 0 | 3.0 |

**Maximum Marks(Internal):50** **Maximum Marks(External):50**

**Minimum Pass Marks(External):40%**

**Course Objectives:**

The Foundations of International Business course will provide students with an overall picture, theoretical principles and practices, of the international business field. It covers a wide range of topics such as the social/cultural, economic, political and legal aspects of the international business environment, the theories and institutions related to international trade and foreign investment, the world financial environment, the dynamics of international business-government relationships, and the strategies used to enter international markets.

**SECTION-A**

Understanding the nature and scope of International business / international trade, Origin of International trade. International Business Environment: Economic; Socio- Cultural, Political and Legal environment, Managing Diversities, Analyzing World Conditions and their impact on International trade.

Theories of International Business: Comparative Cost Theory, Opportunity Cost Theory, Adams Theory of Absolute Differences in Cost, Mills Theory of Reciprocal Demand. Modes of entering International Business. Government Intervention in International Business: Economic Rationale for Government Intervention, Non-economic Rationale for Government Intervention, Tariffs, Non-Tariffs Trade Barriers, Investment Barriers, Subsidies and Other Government Support Programs

**SECTION-B**

Regional Economic Integration: Types of Regional Integration; Factors Influencing Regional Integration. Leading Economic Blocs. .Foreign Investments: Foreign Institutional Investments (FIIs); Foreign Direct Investments (FDIs): Motives; Types; Costs and Benefits; Trends and Implications.

General Agreement on Tariffs and Trade (GATT) and Evolution of World Trade Organization (WTO); Agreements at The Uruguay Round: Plurilateral Agreements and Multilateral Agreements: Agreement on Agriculture (AOA); Trade Related Investment Measures (TRIMS); Agreement on Subsidies and Counter Availing Measures; Agreement on Trade Related Aspects of Intellectual Properties Rights (TRIPS) and General Agreement in Trade and Services (GATS). Ministerial Conferences of the WTO: Impact of WTO on Developing Countries.

**Recommended Books:**

1. International Business – A Strategic Management Approach by Alan N Rugman, R.M. Hodgetts, McGraw Hill.
2. Simai, Mihaly, The Future of Global Governance, Washington, D.C., United States Institute of Peace Process, 1994.
3. Cavusgil, S. Knight Gary and Riesenberger, John R(2009), International Business- Strategy Management and the New Realities, Pearson Education, Dorling Kindersley (India) Pvt. Ltd, Delhi.
4. Rao, M.B and Guru Manjula (1998), WTO and International Trade, Vikas Publishing House Pvt. Ltd, New Delhi.
5. All India Management Association (1998), Global Trends in Finance and Opportunity for India, Excell Books , New Delhi.
6. Rao, P. Subba (2008), International Business, Text and Cases, IInd edition, Himalaya Publishing House Pvt. Ltd. New Delhi.
7. Shailaja G, (2008), International Finance, University Press (India), Pvt. Ltd, Hyderabad, India.
8. Daniel, John D., Radebangh, Lee H. and Sulivan Daniel P., International Business – Environment and Operations, 19th Ed., New Delhi.
9. Czinkota Michael R., Ronbiben Iikka A. Ronkainen A. and Moffet Micheal H., International Business, 6th Edition, Thomson, South Western, Bangalore, 2005.
10. C. Paul Hallwood and Ronald Macdonald, International Money and Finance, Blackwell, Oxford U.K., 1995.
11. Sharan Vyuptakesh, International Business – Concept, Environment and Strategy, 2nd Edition, Pearson Education, Delhi, 2006.
12. Hill, Charles W.L. and Jain, Arun Kumar, International Business – Competing in the Global Market Place, 5th Edition, The McGraw Hill Publishing Co. Ltd., New Delhi, 2006.

**B. TECH FOURTH YEAR**
**COMPUTER SCIENCE & ENGINEERING**

**(Batch 2020)**
**Session (2023-24)**

**SCHEME OF PAPERS**

**EIGHTH SEMESTER (COMPUTER SCIENCE & ENGINEERING)**

| Code | Title of Paper | Total Credits |
|---|---|---|
| PRJ-451 | Project Based Industrial Training<br>(One Semester Training in Industry) | 20 |

**Breakup of Marks:**

**Industrial Visit / Mid Term Evaluation (150 Marks)**
(Within 10—12 weeks of commencement of Training)

| | |
|---|---|
| Presentation | : 30 Marks |
| Viva Voce | : 60 Marks |
| Report (Hard Copy) | : 60 Marks |

Evaluation by Faculty Coordinator is consolation with Industrial Coordinator during industrial visit.

**End Semester Evaluation by a Team of Faculty Members in the Institute (250 Marks)**
(Within One Week of completion of Training)

| | |
|---|---|
| Presentation | : 50 Marks |
| Viva Voce | : 100 Marks |
| Report (Hard Copy) | : 100 Marks |

The Final Presentation and viva – voce will be conducted jointly by the faculty coordinator, external examiner and nominee of the Head to be appointed by the Head of the Department.

The Letter grade will be awarded to the students according to marks obtained by him/her out of total 400 marks.