Semester IV

Sl. No.	Category	Code No.	Course Title	Hours per week			Total Contact Hrs/Week	Credit
				L	T	P		
1	Programme core course-10	CSPC401	Data Structures & Algorithms	3	0	0	3	3
2	Programme core course-11	CSPC402	Introduction to DBMS	3	0	0	3	3
3	Programme core course-12	CSPC403	Computer Networks	2	0	0	2	2
4	Programme core course-13	CSPC404	Software Engineering	2	0	0	2	2
5	Programme core course-14	CSPC405	Data Structures Lab	0	0	2	2	1
6	Programme core course-15	CSPC406	Introduction to DBMS Lab	0	0	2	2	1
7	Programme elective course-1	CSPE407	4. Mobile Application Development / 5. Object Oriented Programming Methodology / 6. Multimedia Technologies	3	0	0	3	3
8	Mandatory course	HS408	Professional Skill Development	2	1	0	3	3
9	Minor Project	CSPR409	Mini Project	0	0	4	4	2
10	Mandatory Course-1	AU401	Essence of Indian Knowledge and Tradition	2	0	0	2	0
			Total				**26**	**20**

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DATA STRUCTURES & ALGORITHMS

Course Code	CSPC401
Course Title	Data Structures & Algorithms
Number of Credits	3 (L:3, T:0, P:0)
Prerequisites	-
Course Category	Program core course

Course Outcomes: -Upon completion of the course the students will be able to:

1)Classify Data structures **(K2)**
2) Describe Linear Data Structures **(K2)**
3) Explain Non-Linear Data Structures**(K2)**
4) Explain basic algorithmic concepts and recursion **(K2)**
5) Apply different Sorting and Searching Algorithms**(K3)**

Course Content:-

Module- 1: Introduction to Data Structures

Number of class hours: 3-4 Hours

Suggestive Learning Outcomes: After completing this module students will be able to-

1) Define Data Structures
2) Classify Data Structures
3) Describe operations on Data Structures

Detailed content of the unit: - Basic Terminology, Classification of Data Structures, Operations on Data Structures

Module- 2: Linear Data Structures

Number of class hours: 10-12 Hours

Suggestive Learning Outcomes: After completing this module students will be able to-

1) Explain Arrays and operations on Arrays
2) Illustrate Linked List and operations on Linked List
3) Demonstrate Stack, Queue and related applications.

Detailed content of the unit: -
Arrays: Introduction to Arrays, Representation in Memory, Operations on an Array, Two Dimensional Arrays

Linked Lists: Singly Linked List, Representation in Memory, Operations on a Single Linked List, Circular Linked Lists, Doubly Linked Lists.

Stacks: Introduction to Stacks, Array Representation of Stacks, Operations on a Stack, Linked List Representation and Operations of Stack, Applications of Stacks-Infix-to-Postfix Transformation, evaluating Postfix Expressions.

Queues: Introduction to Queues, Array Representation of Queues, Operations on a Queue, Linked List Representation and Operations of Queue, Types of Queues-DeQueue, Circular Queue, Applications of Queues-Round Robin Algorithm

Module-3:Non Linear Data Structures

Number of class hours: 6-8 Hours

Suggestive Learning Outcomes: After completing this module students will be able to-

1) Explain Tree
2) Explain operations on Binary Tree
3) Explain Graph and its various representations

Detailed content of the unit: - Trees: Basic Terminologies, Definition and Concepts of Binary Trees, Representations of a Binary Tree using Arrays and Linked Lists, Operations on a Binary Tree-Insertion, Deletion, Traversals, Types of Binary Trees.

Graphs: Graph Terminologies, Representation of Graphs- Set, List, Matrix, Graph Traversals.

Module-4: Introduction to Algorithms

Number of class hours: 3-5 Hours

Suggestive Learning Outcomes: After completing this module students will be able to-

1) Define Algorithms and Flowcharts
2) Define Time & Space complexity
3) Explain recursion with examples

Detailed content of the unit: - Algorithms and flow charts, Time & Space complexity (definition only)
Recursion: Basic concepts and examples of recursion e.g. factorial problem, Fibonacci sequence.

Module- 5: Sorting & Searching Algorithms

Number of class hours: 7-10 Hours

Suggestive Learning Outcomes: After completing this module students will be able to-

1) Apply various Sorting Algorithms
2) Apply different Searching Algorithms

Detailed content of the unit: - Sorting Algorithms**:** Algorithms and their analysis (time and space) — Bubble sort, Selection Sort, Insertion Sort, Quick Sort, Merge Sort, Heap sort and Radix Sort

Searching Algorithms**:** Linear search — Binary search –Concept of Hashing.

References: - 1) Data Structures, R.S. Salaria, Khanna Book Publishing, New Delhi
2) Data Structures Using C, Reema Thareja, Oxford University Press India.
3) Classic Data Structures, SamantaDebasis, Prentice Hall of India.
4) Fundamentals of Data Structure in C, Horowitz, Ellis, Sahni, Sartaj, Anderson-Freed, Susan, University Press, India.
5) Data Structures: A Pseudo code approach with C, Richard F. Gilberg, Behrouz A. Forouzan, CENGAGE Learning, India.
6) Data Structures and Algorithms: Concepts, Techniques and Applications, G. A. V. Pai, McGraw- Hill Education, India.
7) Introduction to Algorithms, T.H. Cormen, C.E. Leiserson, R. L. Rivest, C. Stein, MIT Press

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INTRODUCTION TO DBMS

Course Code	CSPC402
Course Title	Introduction to DBMS
Number of Credits	3 (L: 3, T: 0, P: 0)
Prerequisites	-
Course Category	Programme core course

Course Outcomes: -Upon completion of the course the students will be able to:

1)Describe the requirements and applications of DBMS **(K2)**
2) Utilize ER and EER model**(K3)**
3) Apply relational algebra and calculus**(K3)**
4) Develop SQL programs **(K4)**
5) Utilize Normalization techniques and relational database design algorithms Architecture **(K3)**

Course Content:-

Module- 1: Introduction to DBMS

Number of class hours: 3-4 Hours

Suggestive Learning Outcomes: After completing this module students will be able to-

1) Define DBMS
2) List the requirements of DBMS
3) Describe the applications of DBMS

Detailed content of the unit: - Introduction; Database System Concepts and Architecture.

Module- 2: ER model and EER model

Number of class hours: 4-6 Hours

Suggestive Learning Outcomes: After completing this module students will be able to-

1) Explain data modelling using ER and EER model
2) Utilize ER model
3) Utilize EER model

Detailed content of the unit: - Data Modeling using the Entity-Relationship Model; The Enhanced Entity-Relationship (EER) model.

Module-3:Relational Data model, Relational Algebra and Calculus

Number of class hours: 8-10 Hours

Suggestive Learning Outcomes: After completing this module students will be able to-

1) Explain relational data model and relational database constraints
2) Demonstrate ER/EER to Relational Model mapping
3) Apply relational algebra and relational calculus

Detailed content of the unit: - The Relational Data Model and Relational Database Constraints; ER/EER to Relational Model mapping; Relational Algebra and Relational Calculus.

Module-4: SQL

Number of class hours: 10-12 Hours

Suggestive Learning Outcomes: After completing this module students will be able to-

1) Define schema, constraints, queries and views etc.
2) Categorize DDL, DML etc.
3) Develop SQL programs

Detailed content of the unit: SQL-99: Schema definition, Constraints, Queries, and Views; Security; Introduction to SQL programming Techniques.

Module- 5: Normalization

Number of class hours: 5-6 Hours

Suggestive Learning Outcomes: After completing this module students will be able to-

1) Explain functional dependencies
2) Normalize relational database tables

3) Utilize relational database design algorithms and further dependencies

Detailed content of the unit: - Functional dependencies and normalization for relational databases; Relational database design algorithms and further dependencies.

References: - 1) Fundamentals of Database Systems, Elmasri&Navathe, Pearson Education
2) Database Management Systems, Raghurama Krishnan, Johannes Gehrke, Tata McGraw-Hill.
3) Database System Concepts, Abraham Silberschatz, Henry F. Korth, S. Sudarshan, McGraw-Hill, New Delhi, India.
4) Introduction to Database Systems, C.J.Date, Pearson Education
5) Introduction to SQL, Rick F.VanderLans, Pearson Education

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COMPUTER NETWORKS

Course Code	CSPC403
Course Title	Computer Networks
Number of Credits	2 (L: 2, T: 0, P: 0)
Prerequisites	-
Course Category	Programme core course

Course Outcomes: -Upon completion of the course the students will be able to:

1)Describe the Computer networks and network models **(K2)**
2) Use different transmission media **(K3)**
3) Explain network layer and routing **(K2)**
4) Explain the transport layer and its protocols **(K2)**
5) Utilize different network devices **(K3)**

Course Content:-

Module- 1: Introduction

Number of class hours: 3-4 Hours

Suggestive Learning Outcomes: After completing this module students will be able to-

1) Describe the computer networks
2) Describe the OSI reference model
3) Describe the TCP/IP model

Detailed content of the unit: - Introduction to computer networks; Network Models- OSI Reference Model, TCP/IP Model

Module- 2: Transmission Media

Number of class hours: 5-6 Hours

Suggestive Learning Outcomes: After completing this module students will be able to-

1) Utilize wired transmission media
2) Explain various wireless transmission media
3) Explain data link layer & different protocols

Detailed content of the unit: - Transmission Media – principles, issues and examples; Wired Media – Coaxial, UTP, STP, Fiber Optic Cables; Wireless Media – HF, VHF, UHF, Microwave, Ku Band; Network topologies; Data Link Layer –design issues, example protocols (Ethernet, WLAN, Bluetooth); Switching Techniques

Module-3:Network Layer

Number of class hours: 5-6 Hours

Suggestive Learning Outcomes: After completing this module students will be able to-

1) Explain network layer and its protocols
2) Explain principles/issues in routing
3) Explain different routing algorithms and protocols

Detailed content of the unit: - Network Layer - design issues, example protocols (IPv4); Routing - principles/issues, algorithms (Distance-vector, Link-state) and protocols (RIP, OSPF)

Module-4: Transport Layer

Number of class hours: 5-6 Hours

Suggestive Learning Outcomes: After completing this module students will be able to-

1) Describe different design issues of transport layer
2) Explain transport layer protocols (TCP)
3) Describe different application layer protocols (SMTP, DNS)

Detailed content of the unit: - Transport Layer - design issues, example protocols (TCP); Application Layer Protocols (SMTP, DNS)

Module- 5: Functioning of Network Devices

Number of class hours: 5-6 Hours

Suggestive Learning Outcomes: After completing this module students will be able to-

1) Use different network devices

2) Explain network management system
3) Explain network management system protocols

Detailed content of the unit: - Functioning of Network Devices – NIC, Hub, Switch, Router, WiFi Devices; Network Management System and example protocol (SNMP)).

References: - 1) Computer Networks, 4th Edition (or later), Andrew S. Tanenbaum, PHI
2) TCP/IP Illustrated, Volume-1, W. Richard Stevens, Addision Wesley
3) Data and Computer Communications, William Stallings, PHI
4) An Engineering Approach to Computer Networking, S. Keshav, Addision Wesley/Pearson
5) An Integrated Approach to Computer Networks, Bhavneet Sidhu, Khanna Publishing House

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SOFTWARE ENGINEERING

Course Code	CSPC404
Course Title	Software Engineering
Number of Credits	2 (L: 2, T: 0, P: 0)
Prerequisites	-
Course Category	Program Core Course

Course Outcomes: -Upon completion of the course the students will be able to:
1)Describe Software engineering, life cycle and process models **(K2)**
2) Demonstrate software development **(K2)**
3) Utilize different software testing techniques**(K3)**
4) Apply project management tools **(K3)**

Course Content: -

As per the course design, concepts learned as part of this course will/should be used in the Mini Project (PR401). These two courses should go hand in hand to be effective.

Module- 1: - Introduction to Software Engineering

Number of class hours: 3-4 Hours

Suggestive Learning Outcomes: After completing this module students will be able to-
1) Describe the basic concepts of software engineering
2) Describe software life cycle

3) Describe process models

Detailed content of the unit: - Introduction to Software Engineering, Lifecycle, Process Models - Traditional v/s Agile processes.

Module- 2: Development Activities

Number of class hours: 6-7 Hours

Suggestive Learning Outcomes: After completing this module students will be able to-

1) Explain requirements gathering and analysis
2) Demonstrate software design concepts
3) Summarize effective coding and debugging techniques.

Detailed content of the unit: - Development Activities - Requirements Gathering and Analysis, Design Concepts, Software architecture and Architectural styles, Basic UI design, Effective Coding and Debugging techniques.

Module-3:Software Testing

Number of class hours: 5-6 Hours

Suggestive Learning Outcomes: After completing this module students will be able to-

1) Illustrate software testing
2) Describe different testing techniques
3) Write and execute test cases.

Detailed content of the unit: - Software Testing Basics, Unit, Integration, System and Acceptance Testing, Introduction to various testing techniques (e.g. Stress testing), Writing and executing test cases, Quality Assurance.

Module-4: Project Management

Number of class hours: 4-5 Hours

Suggestive Learning Outcomes: After completing this module students will be able to-

1) Describe project management concepts
2) Explain configuration and release management
3) Utilize version control and its tools

Detailed content of the unit: - Project Management - Project management concepts, Configuration and Release Management, Version Control and its tools (Git), Release Planning, Change Management, Software Maintenance, Project Metrics.

References: - 1) Software Engineering – A Practitioner's Approach, 7th Edition, Roger Pressman.
2) Software engineering, Ian Sommerville, Pearson Education

3) An Integrated Approach to Software Engineering, Pankaj Jalote, Springer Verlag
4) Software Engineering, Nasib Singh Gill, Khanna Book Publishing Co. India.
5) Software Engineering, K. K. Agarval, Yogesh Singh, New Age International Publishers.

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DATA STRUCTURES LAB

Course Code	CSPC405
Course Title	Data Structures Lab
Number of Credits	1 (L:0, T:0, P:2)
Prerequisites	-
Course Category	Program core course

Course Outcomes: -Upon completion of the course the students will be able to:

1)Implement single and two dimensional array **(K3)**
2) Develop programs to implement different search operations **(K3)**
3) Implement sorting algorithms**(K3)**
4) Implement different types of Linked List **(K3)**
5) Utilize array and linked list to implement Stack and Queue**(K3)**
6) Implement binary tree **(K3)**

Course Content:-

Sl No	Topics for practice
1	Write a program to implement array
2	Write a program to add two matrices using two dimensional arrays
3	Write a program using recursive and non-recursive functions to perform search operation in a given list of integers using linear search technique
4	Write a program to implement search operation in a given list of integers using binary search technique
5	Write a program to implement insertion sorting for a given random data
6	Write a program to implement bubble sorting for a given random data
7	Write a program to implement quick sorting for a given random data
8	Write a program to implement selection sorting for a given random data
9	Write a program to implement heap sorting for a given random data
10	Write a program to implement Hashing tables
11	Write a program to implement single linked list
12	Write a program to implement double linked list
13	Write a program to implement circular linked list

14	Write a program to Implement Stack operations using array and linked list
15	Write a program to Implement Queue operations using array and linked list.
16	Write a program to implement Breadth First Search (BFS)
17	Write a program to implement Depth First Search (DFS)
18	Write a program to implement a binary tree of integers
19	Write a program to find the minimum depth of a binary tree

Above programs may be developed using C programming language

References: - 1) Data Structures, R.S. Salaria, Khanna Book Publishing
2) Data Structures Using C, Reema Thareja, Oxford University Press India.
3) Classic Data Structures, SamantaDebasis, Prentice Hall of India.
4) Fundamentals of Data Structure in C, Horowitz, Ellis, Sahni, Sartaj, Anderson-Freed, Susan, University Press, India.
5) Data Structures: A Pseudo code approach with C, Richard F. Gilberg, Behrouz A. Forouzan, CENGAGE Learning, India.
6) Data Structures and Algorithms: Concepts, Techniques and Applications, G. A. V. Pai, McGraw- Hill Education, India.

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INTRODUCTION TO DBMS LAB

Course Code	CSPC406
Course Title	Introduction to DBMS Lab
Number of Credits	1 (L:0, T:0, P:2)
Prerequisites	-
Course Category	Program core course

Course Outcomes: -Upon completion of the course the students will be able to:

1)Apply DDL commands to create a tableand insert data into it **(K3)**
2) Utilize DML commands to modify database contents**(K3)**
3) Implement Employee database**(K3)**
4) Prepare E-R model, Relational model etc.**(K3)**
5) Apply Normalization techniques**(K3)**

Course Content:-

Sl No	Topics for practice
1	Case Study-1: Employee database – 'Create' employee table, 'Select' and display an employee matching a given condition, 'Delete' duplicate records, delete rows using triggers, insert and update records, find net salary, etc.
2	Case Study-2: Visitor Management database
3	Case Study-3: Students Academic database

4	Case Study-4: Inventory Management System database
5	Case study-5: Bank Operations database
6	Case Study-6: Bus Operator (Roadways) – Do related activities such as prepare E-R Model, Relational Model, do Normalization, Create Tables, Insert data, Delete Data, Query database, create stored procedures, etc

References: - 1) Elmasri&Navathe, Fundamentals of Database Systems, Pearson Education
2)Raghurama Krishnan, Johannes Gehrke, Database Management Systems, Tata McGraw-Hill,New Delhi, India.Computer Engineering Curriculum Structure 344
3) Abraham Silberschatz, Henry F. Korth, S. Sudarshan, Database System Concepts, McGraw-Hill, New Delhi, India.
4) Introduction to Database Systems, C.J.Date, Pearson Education
5) Introduction to SQL, Rick F.VanderLans, Pearson Education

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MOBILE APPLICATION DEVELOPMENT

Course Code	CSPE407-1
Course Title	Mobile Application Development
Number of Credits	3 (L: 3, T: 0, P: 0)
Prerequisites	Basic knowledge of Java and XML
Course Category	Programme Elective Course

Course Outcomes: -

After the completion of the course Student will be able to

1) Recognize the concept of application development for mobile devices**(K1)**
2) Install and configure mobile application development tools **(K2).**
3) Create mobile applications and activities**(K3)**
4) Design user Interfaces for the mobile applications**(K3)**
5) Create database for saving, retrieving, and loading data in mobile application development

Course Content:-

Module- 1: Introduction to Mobile Application Development

Number of class hours: 4-5 Hrs

Suggestive Learning Outcomes: After completing this module students will be able to-

1) Recognize mobile computing platforms and mobile computing

2) Recognize mobile development environments
3)Explains the basic concepts of Android phone features

Detailed content of the unit: - Concept of application development for mobile devices, mobile computing platforms and mobile computing, smart devices, mobile development environments, Android phone features and capabilities.

Module- 2: Installation and configuration of Android app development tools

Number of class hours: 5-6 Hrs

Suggestive Learning Outcomes:

1) Install and configure Android app development tools
2) Deploy the app to an emulator and a device.
3) Recognizes the structure of an Android application

Detailed content of the unit: - Android- Background &Architecture, Installation and Configuration of application development tools, Java Software Development Kit (JDK), Android Software Development Kit (SDK), Android Studio, Android Virtual Device and SDK Manager, SDK Manager, The Android Emulator, Dalvik Debug Monitor Service (DDMS), The Android Debug Bridge (ADB).

Module- 3: Creating applications and activities

Number of class hours: 9-10 Hrs

Suggestive Learning Outcomes: After completing this module students will be able to-

1) Use necessary tools for Android application development
2) Explains the relationship between XML and Java for the Android platform.
3)Creates, writes and tests Android applications

Detailed content of the unit: - Creating applications and activities, Introducing the Application Manifest, Using the Manifest Editor, Activity Life Cycle, Android Activity Classes,Understanding Application Priority and Process States, Externalizing Resources, Creating Resources, Creating Simple Values Styles and Themes, Drawables, Layouts, Animations, Menus, Using Resources, Using Resources in Code, Referencing Resources within Resources, Using System Resources

Module- 4: Designing and developing User Interfaces for the Android platform

Number of class hours: 5-6 Hrs

Suggestive Learning Outcomes: After completing this module students will be able to-

1) Create User Interface and Intents

2) Launch Activities and passing information between Activities
3) Create custom SurfaceViews and simple animations

Detailed content of the unit: - Android Applications, Activities and Widgets, ActionBar Activities, Customizing, Styles and Themes, Displaying images, Playing video and audio, UI Fragments and the Fragment Manager, Creating custom SurfaceViews and simple animation, responding to touch events, Supporting different devices, localizations, orientations, API levels, and resolutions., XML resources, Launching Activities and passing information between Activities, Introducing Intents, Using Intents to Launch Activities, Explicitly Starting New Activities, Implicit Intents

Module- 5: Database -- saving, retrieving, and loading

Number of class hours: 5-6 Hrs

Suggestive Learning Outcomes: After completing this module students will be able to-
1) Discuss different ways to store and retrieve data
both in the app and externally.
2) Create database and connect with android application
Database

3)Use SQLite Database in application development

Detailed content of the unit: - Introducing Android Databases, Introducing SQLite Databases, Introducing Content Providers, Introducing SQLite, Cursors and Content Values, Working with SQLite Databases Introducing the SQLiteOpenHelper, Opening and Creating Databases without SQLiteHelperAndroid Database Design Considerations, Querying a Database, Extracting Results from a Cursor, Adding, Updating, and Removing Rows, Inserting New Rows, Updating a Row, Deleting Rows

References: - 1) Android App Development for Dummies, Michael Burton
2)Fundamentals of Android App Development, Sujit Kumar Mishra
3) Android Programming: The Big Nerd Ranch Guide,Kristin Marsicano,Chris Stewart

OBJECT ORIENTED PROGRAMMING METHODOLOGY

urse Code	CSPE407-2
urse Title	Object Oriented Programming Methodology
mber of Credits	3 (L: 3, T: 0, P: 0)
erequisites	CSPC301
urse Category	Programme elective course

Course Outcomes: -Upon completion of the course the students will be able to:

1) Describe the different features of Object Oriented Programming**(K2)**
2) Write programs to Implement the concepts of classes and objects**(K3)**
3) Create new classes using the concepts of inheritance**(K3)**
4) Apply knowledge of Polymorphism to solve real life problems**(K3)**
5) Implement exception handling mechanism **(K3)**

Course Content:-

Module- 1: Introduction to Object Oriented Programming

Number of class hours: 5-6 Hours

Suggestive Learning Outcomes: After completing this module students will be able to-

1) List the different features of ObjectOrientedProgramming
2) Recognize different function oriented programming and ObjectOriented Programming
3) Describe the merits and limitations of Object OrientedProgramming.

Detailed content of the unit: - Object Oriented Paradigm Objects and Classes, Features Object oriented Programming, Structured Vs Object Oriented Development, Features of Object Oriented Languages, Applications ofObjectOriented Programming, Merits and Limitations of Object Oriented Programming.Basic Data types, Basic Type modifiers, Derived Data types, Variables, Storage class specifiers, Initializing variables, Operators, Unformatted Console and stream I/O Functions, Formatted Console I/O Functions

Module- 2: Classes and Objects

Number of class hours: 5-6 Hours

Suggestive Learning Outcomes: After completing this module students will be able to-

1) Declare and define a class with appropriate data members and member functions
2) Use different access specifiers in class definition
3) Create constructors and destructors in programs

Detailed content of the unit: - Classes ,Class Members and Creating Objects, Member functions, Member Access Specifiers (public, private, protected), Static class member, Inline Functions, Arrays within a Class and Array of Objects, Passing Objects as function arguments and returning object from a function,Constructors, Overloaded Constructors, Null Contradictor, Copy Constructor, Destructors Constraints on Constructors and Destructors

Module- 3: Inheritance

Number of class hours: 5-6 Hours

Suggestive Learning Outcomes: After completing this module students will be able to-

1) Define base class and derived class
2) Write programs to implement different types of inheritance
3) Create virtual base class

Detailed content of the unit: - Base and Derived classes, Accessing Base class members and Access Control, Overriding member functions, Multi Level, Multiple, Hierarchical& Hybrid Inheritance, Virtual Base Class.

Module- 4: Polymorphism

Number of class hours: 5-6 Hours

Suggestive Learning Outcomes: After completing this module students will be able to-

1) Describe the concepts of function overloading and operator overloading
2) Write programs to implement virtual function
3) Discuss the concepts of early and late binding

Detailed content of the unit: - Fundamental of Polymorphism, Overloading Functions, Overloading Operators (Unary, binary, string manipulation using operator), Pointer to object and derived class, 'This' pointer, Virtual Functions, Early and Late Binding, Rules of Virtual Functions, Pure Virtual Function, Friend Functions.

Module- 5: File Handling, Exception Handling & Templates

Number of class hours: 5-6 Hours

Suggestive Learning Outcomes: After completing this module students will be able to-

1) Discuss the basic file operations
2) Describe the exception handling mechanism
3) Write programs to implement functions template and class templates

Detailed content of the unit: - Basic File Operations, File Handling, Classes for file stream operation, Opening and Closing Files, File modes File, Introduction to Exception Handling, Catching Class Types, Multiple Catch Handlers, Exception Specification, Generic Functions/Function Templates, Template Arguments.

References: -

1. Object Oriented Programming With C++, E Balagurusamy
2. Object oriented programming in C++ , Robert Laffore
3. Introduction To Programming With C++, Diane Zak
4. Object oriented programming with C++ Reema Thareja

MULTIMEDIA TECHNOLOGIES

Course Code	CSPE407-3
Course Title	Multimedia Technologies
Number of Credits	3 (L: 3, T: 0, P: 0)
Prerequisites	---
Course Category	Programme core course

Course Outcomes: -Upon completion of the course the students will be able to:

6) Describe the concepts of designing and developing multimedia **(K2)**
7) Use the various data compression techniques **(K3)**
8) Design and develop multimedia solutions **(K3)**
9) Describe the basics of graphics and image data representations **(K2)**
10) Use programming in interactive multimedia development **(K3)**

Course Content:-

Module- 1: Introduction to Multimedia

Number of class hours: 5-6 Hours

Suggestive Learning Outcomes: After completing this module students will be able to-

4) List the components of multimedia
5) Recognize different multimedia hardware and software
6) Describe multimedia communication system

Detailed content of the unit: - Multimedia Foundation and Concepts: Multimedia Hardware, Multimedia Software, Multimedia operating systems, Multimedia communication system.

Module- 2: Basic Compression Techniques

Number of class hours: 3-4 Hours

Suggestive Learning Outcomes: After completing this module students will be able to-

1) Discuss various video and audio data compression techniques.
2) List different data compression algorithms/standards.
3) Use different video and audio data compression Techniques

Detailed content of the unit: - Video and Audio Data Compression Techniques – Lossy and Lossless. Example algorithms/standards: Huffman, RLE, JPEG, MPEG, MP3, MP4, LZMA, FLAC, ALAC, ITU G.722, H.261, H.265.

Module- 3: Content Development and Distribution

Number of class hours: 5-6 Hours

Suggestive Learning Outcomes: After completing this module students will be able to-

4) Use different desktop publishing software
5) Develop multimedia animations
6) Use multimedia distribution techniques

Detailed content of the unit: - Desktop publishing (Coral Draw, Photoshop, Page maker) Multimedia Animation & Special effects (2D/3D animation, Flash).

Module- 4: Introduction to Digital Imaging

Number of class hours: 5-6 Hours

Suggestive Learning Outcomes: After completing this module students will be able to-

4) Describe the concepts of representing image in Computer Systems
5) Recognize different types of digital images
6) Use of digital Images in multimedia

Detailed content of the unit: - Basics of Graphic Design and use of Digital technology, Definition of Digital images, Digital imaging in multimedia.

Module- 5: Introduction to Multimedia Programming and Applications

Number of class hours: 5-6 Hours

Suggestive Learning Outcomes: After completing this module students will be able to-

1) Use appropriate programming language for developing multimedia
2) Write program to develop interactive multimedia solutions
3) Test multimedia applications and fix bugs arise

Detailed content of the unit: - Basic programming concepts, HTML basics, Java Scripts for interactive website Development, Programming in Macromedia Flash.

References: - 1) An Introduction to Multimedia Authoring, A. Eliens
2) Fundamentals of Multimedia, Prentice Hall/Pearson, Ze-Nian Li & Mark S. Drew.
3) Multimedia and Animation, V.K. Jain, Khanna Publishing House, Edition 2018.
4) Fundamentals of Multimedia, Ramesh Bangia, Khanna Book Publishing Co., N. Delhi (2007)

Professional Skill Development

Course Code	:	HS 408
Course Title	:	Professional Skill Development
Number of Credits	:	3 (L: 2, T: 1, P:0)
Prerequisites	:	NIL
Course Category	:	HU

Course Outcomes:

After successful completion of this course, students would be able to:
CO1: Understand the importance of soft skills and personality in a person's career growth. K2
CO2: Communicate uprightly while looking for a job. K3
CO3: Learn and utilize the key skills while facing job interview. K2 & K3
CO4: Demonstrate effective writing skills for professional excellence. K2
CO5: Explore ways to make oral communications interesting and captivating. K3

Module – 1Soft Skills & Personality Development

Number of Class Hours: 06 **Marks: 08**

Learning Outcomes:

1) Get acquainted with the details of soft skills and the importance of personality. K1
2) Understand the importance of communication skills in developing one's personality. K2
3) Understand the importance of soft skills and personality in a person's career growth. K2

Detailed Content:

1. **Soft skills - Demand of Every Employer:** How soft skills complement hard skills, Soft skills as competitive weapon, Classification of soft skills into personal and interpersonal traits, Soft skills needed for career growth- Time management, Leadership traits, Communication and networking skills, Teamwork and Interpersonal skills, Empathy and Listening skills, Responsibility, Attitude, Ethics, Integrity, Values and Trust.

2. **Personality Development – A must for career Growth:** Grooming one's personality as a signal that others read, mapping different personality types – Perfectionists, Helpers, Achievers, Romantics, Observers, Questioners, Enthusiasts or adventurers, Bosses or asserters, Mediators or peacemakers.

Module – 2 Looking for a Job

Number of Class Hours: 05 **Marks: 08**

Learning Outcomes:

1) Learn to write Job Applications, Cover Letter, Resume, Curriculum Vitae, bio data. K2
2) Develop interpersonal skills/ soft skills through Group Discussion. K3

Detailed Content

1. Job Application : Job Application Letters in response to advertisements, Self-application letters for Jobs
2. Curriculum Vitae/Resume: Formats of Resume and CV for a fresher and for someone with experience, Differences between Resume, CV, Bio-data, and choice of referees.
3. Group Discussion : A test of soft skills

Module – 3 Job Interviews

Number of Class Hours: 05 **Marks: 08**

Learning Outcomes:

1) Understand the importance of Job interviews in the selection procedure. K2
2) Comprehend and Adapt to various types, stages and processes of job interviews. K1&K3
3) Demonstrate appropriate body language in interviews. K3

Detailed Content

1. Job Interviews: Definition, processes of Interviews, Types of Interviews
2. Stages in Job interviews: Before interview stage, On D' Day, After interview stage.
3. Importance of Body language in Interviews: : Facing an interview, Using proper verbal and non- verbal cues, the perfect handshake ,Exhibiting confidence, the business etiquettes to maintain, body language ,and dress code - what to speak, how to speak in an interview and answer interview questions, negative body language, handling an awkward situation in an interview.
4. Probable interview questions and answers.
5. Mock interviews to be conducted by mock interview boards.

Module – 4 Enhancing Writing skills

Number of Class Hours: 12 **Marks: 08**

Learning Outcomes:

1) Write dialogues on given topics / situations. K3
2) Express facts & ideas effectively in written form. K3

3) Learn to write formal and informal letters & emails. K2

Detailed Content

1) **Art of Condensation**: Principles to increase clarity of written communication.
2) **Dialogue Writing:** Meeting and Parting, Introducing and Influencing, Requests, Agreeing and Disagreeing, Inquiries and Information.
3) **Letter Writing:** Placing an order, Letter to Inquiry, Letter of Complaint, Letter seeking permission.
4) **E- mail writing**: writing the perfect e-mail, steps to the perfect e-mail, formal and informal greetings, requests through an e-mail, writing an apology, complaint and seeking help and information in an e-mail, informing about a file attached in an email, writing the formal ending of an e-mail.

Module – 5 Conversations, Panel Discussion and Public Speaking

Number of Class Hours: 12 **Marks: 08**

Learning Outcomes:

1. Speak persuasively on a given topic fluently and clearly. K3
2. Participate in formal and informal conversations. K3
3. Express ideas and views on given topics. K3

Detailed Content

1) **Conversation & Dialogue Practice:**
   a) Introducing oneself
   b) Introduction about family
   c) Discussion about the weather
   d) Seeking Permission to do something
   e) Seeking Information at Railway Station/ Airport
   f) Taking Appointments from superiors and industry personnel
   g) Conversation with the Cashier- College/ bank
   h) Discussing holiday plans
   i) Asking about products in a shopping mall
   j) Talking over the Telephone

2) **Panel Discussion:** Act of a moderator - ways to respond to audience questions.
Suggested topics: Current Affairs

3) **Public Speaking**: Art of Persuasion, Making speeches interesting, Delivering different types of speeches: Ceremonial, Demonstrative, Informative, Persuasive.

List of Software/Learning Websites

1. http://www.free-english-study.com/
2. http://www.english-online.org.uk/course.htm
3. http://www.english-online.org.uk/

4. http://www.talkenglish.com/
5. http://www.learnenglish.de/

Reference Books:

(Name of Authors/ Title of the Book /Edition /Name of the Publisher)

1) Sanjay Kumar &Pushp Lata, Communications Skills, 2nd Edition, Oxford University Press
2) Meenakshi Raman & Sangeeta Sharma Technical Communication: Principles & Practice Oxford University Press
3) M. Raman & S. Sharma Technical Communication Oxford University Press
4) Barun Kumar Mitra, Personality Development and Soft Skills Oxford University Press

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Minor Project

Course Code	CSPR409
Course Title	Minor Project
Number of Credits	2 (L: 0, T: 0, P: 4)
Prerequisites	Nil
Course Category	Project Work (PR)

Course Outcome:-

After completion of the course, students will be able to:

C.O.1: Demonstrate a through and systematic understanding of project contents (K2).

C.O. 2: Identify the methodologies and professional way of documentation and communication (K3).

C.O. 3: Illustrate the key stages in development of the project (K2).

C.O. 4: Develop the skill of working in a Team (K3).

C.O. 5: Apply the idea of mini project for developing systematic work plan in major project (K3).

Course Content:-

The minor project topic should be selected / chosen to ensure the satisfaction of the urgent need to establish a direct link between education, national development and productivity and thus reduce the gap between the world of work and the world of study. The course should have the following-

1) Perform detailed study about various components of a project.
2) Study about methodologies and professional way of documentation and communication related to project work.
3) Develop idea about problem formulation.
4) Knowledge of how to organize, scope, plan, do and act within a project thesis.
5) Familiarity with specific tools (i.e. hardware equipment and software) relevant to the project selected.
6) Demonstrate the implementation of a minor project work.

Essence of Indian Knowledge and Tradition

Course Code	AU410
Course Title	Essence of Indian Knowledge and Tradition
Number of Credits	0 (L: 2, T: 0, P: 0)
Prerequisites	NA
Course Category	Audit

Course Outcomes: -

After completion of the course the students will be able to-

CO 1: Understand the essence of Indian tradition and the importance of carrying them forward. (**K_2**)

CO 2: Understand the Vedic literature and important ideas discussed in the Vedas. (**K_2**)

CO 3: Describe scientific heritage of ancient India along with comprehending its relevance and application in various modern scientific disciplines. (**K_1**)

CO 4: Relate the theoretical and practical sides of the science of Yoga and Aurveda with modern knowledge systems. (**K_1**)

CO 5: Explain the worth of Indian intellectual heritage, traditional practices and Indian lifestyle from scientific lenses. (**K_4**)

Module- 1

Name of the Module: Introduction to Vedic Literature

Number of class hours:**05**

Content:

- General structure of Vedic Literature,
- Different theories on the age of the Vedas,
- Educational system in the Vedic times

- subject-matter of Ṛgveda-samhitā, *Sāmaveda -Saṁhitā, Yajurveda-Saṁhitā, Atharvaveda-Saṁhitā, Brāhmaṇa*and *Āraṇyaka* literature, Upaveda

Learning outcomes of the Module

1.	Describe the Vedic literature (K1)
2.	Outline the heritage of ancient India specially the scientific knowledge that is embedded in the Vedas will be shown through this module (K2)

Module- 2

Name of the Unit: Fundamental doctrines of the *Upaniṣad*s

Number of class hours:**05**
Content:

- General introduction of Upaniṣadic literature
- Philosophical ideas and ethics in Upaniṣadas

Learning outcomes of the Module

1.	Understand Upaniṣads and its significance as the perennial source Indian philosophy (K2)
2.	Explain the scientific temperament, knowledge and methods of scientific enquiry that is embedded in the Upaniṣadas (K2)

Module- 3

Name of the Unit: *Vedāṅga*s, Purāṇasand Dharmaśāstra Literature

Number of class hours:**05**

Content:

- Introduction to Vedāṅga Literature
- History of Sanskrit Grammar
- An Overview of Purāṇic literature
- History of Dharmaśāstra

Learning outcomes of the Module

1.	Describe various scientific and academic disciplines of ancient India along with scientific knowledge that is rooted in the Puranic literature (K1)
2.	Remember ancient system of Law and Governance in a nutshell especially the principles and philosophy behind the ancient constitutions (K1)

Module- 4

Name of the Module: Introduction to Indian Philosophical Systems, Scientific aspects of Indian knowledge systems

Number of class hours:**05**

Content:

- General introduction to Indian Philosophical systems, i.e. Orthodox and Heterodox
- Glimpse of ancient Indian Science and technology.

Learning outcomes of the Module

1.	Describe the Indian Philosophical systems and their relevance and application in modern scientific enquiry (K1)
2.	Remember the various scientific methods, means and validity of knowledge as discussed in these systems, methods of discussion, debate and systemic learning as structured in ancient Indian knowledge literature (K1)

Module- 5

Name of the Unit: Introduction to Yoga &Āyurveda

Number of class hours:**05**

Content:

- General ideas about Yoga,
- Origin and Development of Pātañjala Yoga,
- Origin and Development of Āyurveda and its relevance

Learning outcomes of the Module

1.	Understand about principles and philosophy of Yogic sciences and Āyurveda. (K2)
2.	Identify various ancient texts, practices of Yoga and Āyurveda along with gaining basic practical and theoretical knowledge which they will be able to relate with modern healthcare systems (K4)

References: -

1) Capra, Fritjof. *The Tao of Phisics*. New York: Harpercollins, 2007.
2) Capra, Fritjof. *The Web of Life*. London: Harpar Collins Publishers, 1996.
3) Dasgupta, Surendranath& De, Sushil Kumar. *A History of Sanskrit Literature.*Delhi: Motilal Banarsidass, 2017.
4) Dasgupta, Surendranath. *A History of Indian Philosophy*. Delhi: Motilal Banarsidass, 1991.
5) Gonda, Jan. *A History of Vedic Literature*. Delhi: Monohar Publishers and Distributors, 2020.

6) Jha, R.N. *Science and Consciousness Psychotherapy and Yoga Practices*. Delhi: VidyanidhiPrakashan, 2016.
7) Kane. P.V. *History of Dharmasastra*, Poona: Bhandarkar Oriental Research Institute, 1930.
8) Max Muller. *Ancient Sanskrit Literature*, London: Spottiswoode and Co., 1859.
9) *Pride of India*,New Delhi: Samskrita Bharati, 2006.
10) Shastri, Gourinath. *A History of Vedic Literature*, Kolkata: Sanskrit PustakBhandar, 2006.
11) Sinha, Jadunath. *Indian Philosophy*. Delhi: Motilal Banarsidass,1938.
12) Wujastiyk, Dominik. *The Roots of Ayurveda*. India: Penguin India, 2000.

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