

Information Technology

(IT)

(Semester III to VI)

Semester III

Sl. No.	Category	Code No.	Course Title	Hours per week			Total Contact Hrs/Week	Credit
				L	T	P		
1	Programme core course-1	ITPC301	Digital Techniques	2	1	0	3	3
2	Programme core course-2	ITPC302	Computer Programming	2	1	0	3	3
3	Programme core course-3	ITPC303	Operating Systems	2	0	0	2	2
4	Programme core course-4	ITPC304	Database Management	2	0	0	2	2
5	Programme core course-5	ITPC305	Computer System Architecture	2	0	0	2	2
6	Programme core course-6	ITPC306	Digital Techniques Lab	0	0	4	4	2
7	Programme core course-7	ITPC307	Computer Programming Lab using C	0	0	4	4	2
8	Programme core course-8	ITPC308	Operating Systems Lab	0	0	2	2	1
9	Programme core course-9	ITPC309	Database Management Lab	0	0	2	2	1
10	Summer Internship-I (4 weeks) after II nd Semester	ITSI310	Summer Internship-1	0	0	0	0	2
			Total				24	20

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	ITPC401	Scripting Language (Python /Perl – any one)	3	0	0	3	3
2	Programme core course-11	ITPC402	Data Structures	3	0	0	3	3
3	Programme core course-12	ITPC403	Multimedia Technologies	2	0	0	2	2
4	Programme core course-13	ITPC404	Data Communications	2	0	0	2	2
5	Programme core course-14	ITPC405	Scripting Language Lab	0	0	2	2	1
6	Programme core course-15	ITPC406	Data Structures Lab	0	0	2	2	1
7	Programme elective course-1	ITPE407	1. Software Engineering / 2. Data Mining / 3. IoT	3	0	0	3	3
8	Mandatory course	HS408	Professional Skill Development	2	1	0	3	3
9	Minor Project	ITPR409	Mini Project	0	0	4	4	2
10	Mandatory Course-1	AU410	Essence of Indian Knowledge and Tradition	2	0	0	2	0
			Total				26	20

Semester V

Sl. No.	Category	Code No.	Course Title	Hours per week			Total Contact Hrs/Week	Credit
				L	T	P		
1	Programme core course-16	ITPC501	Object Oriented Programming using Java	3	0	0	3	3
2	Programme core course-17	ITPC502	Computer Networks	2	0	0	2	2
3	Programme core course-18	ITPC503	Web Technologies	2	0	0	2	2
4	Programme core course-19	ITPC504	Object Oriented Programming Lab using Java	0	0	2	2	1
5	Programme core course-20	ITPC505	Web Technology Lab	0	0	2	2	1
6	Programme elective course-2	ITPE506	1. Mobile Application Development / 2. Advanced DBMS / 3. Software Testing	3	0	0	3	3
7	Programme elective course-3	ITPE507	1. Mobile Communication / 2. Cloud Computing / 3. Fundamentals of AI	3	0	0	3	3
8	Open elective course-1	OE508	To be offered by other departments	3	0	0	3	3
9	Summer Internship-II (6 weeks) after IV Semester	ITSI509	Summer Internship-II	0	0	0	0	3
10	Major Project	ITPR510	Project part-I	0	0	2	2	1
			Total				22	22

Semester VI

Sl. No.	Category	Code No.	Course Title	Hours per week			Total Contact Hrs/Week	Credit
				L	T	P		
1	Programme core course-21	ITPC601	Wireless and Mobile Network	3	0	0	3	3
2	Programme core course-22	ITPC602	Introduction to Information Technology Management	2	0	0	2	2
3	Programme elective course-4	ITPE603	1. Network and Information Security / 2. Advanced Java Programming / 3. FOSS	3	0	0	3	3
4	Humanities and Social Science course	HS604	Entrepreneurship and Start-up's	3	1	0	4	4
5	Open elective-2	OE605	To be offered by other departments	3	1	0	4	4
6	Mandatory Course-2	AU606	Indian Constitution	2	0	0	2	0
7	Major Project	ITPR607	Project part-2	0	0	6	6	3
8	Seminar	ITSE608	Seminar	2	0	0	2	1
			Total				26	20

Detailed Curriculum Contents of
Semester III

Digital Techniques

Course Code	IIPC 301
Course Title	Digital Techniques
Number of Credits	3 (L: 2, T: 1, P: 0)
Prerequisites	Basic electronics engineering
Course Category	Programme Core Course

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

1. Explain the theory of Boolean algebra.
2. Simplify Boolean expressions
3. Distinguish different logic gates.
4. Evaluate different flip flops.
5. Perform analysis and design of combinational circuits and sequential circuits.

Module- 1: Number Systems and Boolean algebra

Number of class hours: 08

Introduction to different number systems – Binary, Octal, Decimal, Hexadecimal Conversion from one number system to another. Boolean variables – Rules and laws of Boolean Algebra De-Morgan's Theorem Karnaugh Maps and their use for simplification of Boolean expressions.

Module- 2: Logic Gates and Truth Tables

Number of class hours: 06

AND, OR, NOT, NAND, NOR , XOR, XNOR: Symbolic representation and truth table Implementation of Boolean expressions and Logic Functions using gates Simplification of expressions

Module- 3: Combinational Logic Circuits Arithmetic Circuits

Number of class hours: 08

Combinational Logic Circuits Arithmetic Circuits – Addition, Subtraction, 1's 2's Complement, Half Adder, Full Adder, Half Subtractor, Full Subtractor, Parallel and Series Adders Encoder,

Decoder Multiplexer – 2 to 1 MUX, 4 to 1 MUX, 8 to 1 MUX. Applications Demultiplexer – 1 to 2 DEMUX, 1- 4 DEMUX, 1- 8 DEMUX

Module- 4: Sequential Logic Circuits

Number of class hours: 08

Digital clock signal, clock skew, duty cycle, synchronous and asynchronous circuit operation, Edge and Level triggered operation.

Flip-Flops: S-R, J-K, T and D. Truth table and logic circuits of each flip-flop.

Shift Registers: Series and parallel, shift, Serial in serial out, Shift Register.

Counters: Ripple counter, Mod counter, up – down counter, synchronous and asynchronous counters.

A/D and D/A Converter, Digital Clock.

Module-5: Control and Interfacing of process parameters

Number of class hours: 08

Process Logic components for level control loop: Level Switch configuration: HL, HH, HHL, HHH, LL, LLL and LLH.

Process Logic components for Temperature control loop: Temperature Switch configuration: HL, HH, HHL, HHH, LL, LLL and LLH.

Process Logic components for Pressure control loop: Pressure Switch configuration: HL, HH, HHL, HHH, LL, LLL and LLH.

Process Logic components for flow control loop: Flow Switch configuration: HL, HH, HHL, HHH, LL, LLL and LLH.

Process Logic components for Speed control loop: Speed Switch configuration: HL, HH, HHL, HHH, LL, LLL and LLH.

References: -

1. Digital principles & Applications, Albert Paul Malvino & Donald P. Leach, McGraw Hill Education; Eighth edition ISBN: 978-9339203405
2. Digital Electronics Roger L. Tokheim Macmillian McGraw-Hill Education (ISE Editions); International 2 Revised ed edition ISBN: 978-0071167963
3. Digital Electronics – an introduction to theory and practice William H. Gothmann, Prentice Hall India Learning Private Limited; 2 edition ISBN: 978-8120303485
4. Fundamentals of Logic Design, Charles H. Roth Jr., Jaico Publishing House; First edition ISBN: 978-8172247744
5. Digital Electronics, R. Anand, Khanna Publications, New Delhi (Edition 2018) ISBN: 978-93-82609445

Computer Programming

Course Code	ITPC302
Course Title	Computer Programming
Number of Credits	3(L : 2, T : 1, P : 0)
Prerequisites	Interaction with DOS / Windows Operating System
Course Category	Programme Core Course

Course Outcomes: -

After completion of the course student will be able to

- 1) Learn the common units of programming languages
- 2) Identify problems to be solved
- 3) Develop structured solutions to problems
- 4) Express solution in a machine-readable form or a programming language

Detailed Course Contents

Module- 1: Introduction of Programming

Number of class hours: 8

Suggestive Learning Outcomes:

- 1) Identify problems to be solved
- 2) Understand Structure of a program
- 3) Learn various basic units of program and use them.

Detailed content of the unit:

- 1.1. Introduction to Problem Solving
- 1.2. Structured Language and an overview of C
- 1.3. Character set, Tokens, Constants, Variables
- 1.4. Key words and Identifiers
- 1.5. Data types used in C & their size.

Module- 2: Operators and I/O

Number of class hours: 4

Suggestive Learning Outcomes:

- 1) Explain and use various operators
- 2) Illustrate I/O operation

Detailed content of the unit:

- 2.1. Arithmetic, Relational, Logical and Bitwise Operators
- 2.2. Operator precedence

2.3. Input, Output, Formatting and File I/O

Module-3: Control statements

Number of class hours: 7

Suggestive Learning Outcomes:

- 1) Understand and learn various control statements
- 2) Recognize and apply control statements where ever required

Detailed content of the unit:

- 3.1. Decision making and branching statements
- 3.2. if statement (if, ifelse,else-if ladder, nested if-else)
- 3.3. Switch case statement.
- 3.4. Iterative/Loop statement
- 3.5. while, do-while
- 3.6. for Loop structure
- 3.7. Break and continue statement
- 3.8. Conditional and unconditional Goto statement

Module-4: Functions and Arrays

Number of class hours: 8

Suggestive Learning Outcomes:

- 1) Learn and identify types of functions and arrays
- 2) Apply them in solving problems

Detailed content of the unit:

- 4.1. Functions, Need of functions, Difference between library function and user defined Function.
- 4.2. Prototype declaration, Defining functions, Passing parameter types, Function call, Return values
- 4.3. Category of function (No argument No return value, No argument with return value, Argument with return value)
- 4.4. Advantages of arrays
- 4.5. Declaration and initialization of one dimensional, two dimensional and character arrays
- 4.6. Accessing array elements.

Module- 5: Recursion

Number of class hours: 3

Suggestive Learning Outcomes:

- 1) Illustrate recursive function
- 2) Use recursive function

Detailed content of the unit:

- 5.1. Recursion and use of memory stack
- 5.2. Types of recursion,
- 5.3. Advantages and disadvantages of recursive function.

References:

1. Programming in ANSI C, E. Balagurusamy, Tata McGraw-Hill
2. Outline of Programming with C, Byron Gottfried, Schaum, McGraw-Hill
3. Let Us C, Yashavant Kanetkar
4. Programming in C, Reema Thareja, OUP India
5. Problem Solving and Programming in C, R.S. Salaria, Khanna Publishing House
6. Programming in ANSI C, E. Balagurusamy, Tata McGraw-Hill
7. C Programming & Data Structures, B. A. Fouruzan and R. F. Gilberg, CENGAGE Learning.

Operating System

Course Code	ITPC303
Course Title	Operating System
Number of Credits	2 (L: 2, T: 0, P: 0)
Prerequisites	Computer Organization and Digital Design
Course Category	Programme Core Course

Course Outcome:-

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

C.O. 1: Understand the basics of operating systems like kernel, shell, types and services of operating systems. (K2)

C.O. 2: Understand the concept of program, process and thread and analyse various CPU scheduling Algorithms. (K2, K3)

C.O. 3: Describe and analyse the memory management and its allocation policies. (K3)

C.O. 4: Understand the issues related to file system interface and implementation.(K2,K3)

C.O. 5: Understand disk management and explain disk scheduling algorithms for better utilization of external memory. (K2, K3)

C.O. 6: Configure OS in an efficient and secure manner. (K3)

Course Content:

Module 1 – Introduction

Learning Outcomes:-

Students will be able to-

1. Define an operating system.
2. Discuss history of operating system.
3. Discuss about various types of operating systems and operating system services.
4. Define system call with an example.
5. Explain single, multi user operating system structure.

Content:

Overview of Operating System, basic concepts, UNIX/LINUX Architecture, Kernel, services and systems calls, system programs.

Module 2 – Process Management and Memory management

Learning Outcomes:-

Students will be able to-

1. Define process, threads and multithreading.
2. Understand b) process state diagram c) process control block.
3. Describe process creation and termination.
4. Explain various scheduling algorithms – FCFS, SJF, Priority, Round Robin,
5. Explain inter process communication.
6. Explain single partition allocation and multiple partition allocation, paging and segmentation.
7. Describe page replacement algorithms - FIFO, LRU, Optimal.
8. Define concept of thrashing and page fault.

Content:

Process Management: Process concepts, operations on processes, IPC, Process Scheduling, Multithreaded programming.

Memory management: Memory allocation, Swapping, Paging, Segmentation, Virtual Memory, various faults.

Module 3 – File management

Learning Outcomes:-

Students will be able to-

1. Define file management.
2. List and explain various file operations and file access methods.
3. Explain directory structure organization.
4. Describe the concept of file protection.
5. Understand Different types of file systems.

Content:

Concept of a file, access methods, directory structure, file system mounting, file sharing and protection, file system structure and implementation, directory implementation, free space management, efficiency and performance. Different types of file systems.

Module 4 – I/O System

Learning Outcomes:-

Students will be able to-

1. Explain disk structure.
2. Understand swap space management.
3. Explain various disk scheduling algorithms- FCFS, SST, SCAN,C-SCAN, LOOK.
4. Explain various RAID levels.

Content:

Mass storage structure - overview, disk structure, disk attachment, disk scheduling algorithms, swap space management, RAID types.

Module 5 – OS Security**Learning Outcomes:-**

Students will be able to-

1. Understand and identify potential threats to operating system,
2. Explain different Authentication schemes.
2. Explain security features design to guard against threats.

Content:

Authentication, Access Control, Access Rights, System Logs

References/ Suggested Learning Resources:-

1. Operating System Concepts, Silberschatz and Galvin, Wiley India Limited
2. UNIX Concepts and Applications, Sumitabha Das, McGraw-Hill Education
3. Operating Systems, Internals and Design Principles, Stallings, Pearson Education, India
4. Operating System Concepts, Ekta Walia, Khanna Publishing House
5. Modern Operating Systems, Andrew S. Tanenbaum, Prentice Hall of India
6. Operating systems, Deitel & Deitel, Pearson Education, India
7. Principles of Operating Systems, Naresh Chauhan, Oxford University Press India.

Websites for Reference: <http://swayam.gov.in>

DATABASE MANAGEMENT

Course Code	ITPC304
Course Title	Database Management
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 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.Vander Lans, Pearson Education

COMPUTER SYSTEM ARCHITECTURE

Course Code	ITPC305
Course Title	Computer System Architecture
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 functions of computer units (**K2**)
- 2) Explain instruction formats, addressing modes and computer arithmetic (**K2**)
- 3) Explain computer memory system (**K2**)
- 4) Utilize input and output units efficiently (**K3**)
- 5) Utilize Pipeline, Vector Processing and Processors Architecture (**K3**)

Course Content:-

Module- 1: Processor Organization

Number of class hours: 3-4 Hours

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

- 1) Describe the block diagram of a computer
- 2) Describe the function of computer units
- 3) Describe stored program concept

Detailed content of the unit: - Functional block diagram of Digital computer – Simple accumulator based CPU and function of each unit – Stored program concept

Module- 2: Instruction format, Addressing Modes and Computer Arithmetic

Number of class hours: 6-7 Hours

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

- 1) Explain instruction format
- 2) Explain various addressing modes
- 3) Explain different fixed and floating point operations

Detailed content of the unit: - Different instruction format, Addressing Modes, Fixed point and Floating Point addition and subtraction, multiplication and division operations with flowcharts

Module-3: Organization of Computer Memory System

Number of class hours: 5-6 Hours

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

- 1) Explain main and auxiliary memory
- 2) Explain virtual memory and cache memory
- 3) Explain memory interleaving

Detailed content of the unit: - Main and auxiliary memory – Need for memory hierarchy in a computer -Significance of various memory devices characteristics: access time, access rate, alterability, permanence of storage, cycle time – Associative Memory – Virtual memory organization in a computer system – Virtual address and physical address organization – Principle and advantage of cache memory organization- Principle of memory interleaving in a computer

Module-4: Input and Output Organization

Number of class hours: 3-4 Hours

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

- 1) Describe I/O Bus and interface
- 2) Explain Isolated I/O and Memory mapped I/O
- 3) Utilize CPU-IOP Communication

Detailed content of the unit: - I/O Bus and Interface Modules, I/O versus Memory Bus, Isolated versus Memory-Mapped I/O, Example of I/O Interface, CPU-IOP Communication

Module- 5: Pipeline, Vector Processing and Processors Architecture

Number of class hours: 5-6 Hours

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

- 1) Explain parallel processing
- 2) Make use of pipeline processing concepts
- 3) Explain instruction set architectures, RISC and CISC

Detailed content of the unit: - Principle of Parallel processing – Flynn’s classification of Parallel processing – Principle of pipeline processing – Advantages of parallel processing and pipeline processing -Arithmetic instruction pipeline -Vector processing and array processor-Processor-Introduction, Advanced processor technology, instruction set architectures, CISC scalar processor, RISC scalar processor.

- References:** - 1) Computer System Architecture, M. Morris Mano, Pearson Education
2) Advance Computer Architechture , K.Hwang, PHI
3) Computer Organization and Architecture: designing for performance, William Stallings Pearson Publications

Digital Techniques Lab

Course Code	ITPC 306
Course Title	Digital Systems Lab
Number of Credits	2 (L: 0, T: 0, P: 4)
Prerequisites	Digital Systems theory
Course Category	Programme Core Course

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

1. Verify different logic gates and design combinational circuits.
2. Design different flip flops
3. Design shift registers.
4. Design different counters

List of Experiments/Lab Activities:

1. To verify the truth tables for all logic gates – NOT OR AND NAND NOR XOR XNOR using CMOS Logic gates and TTL Logic Gates
2. Implement and realize Boolean Expressions with Logic Gates
3. Implement Half Adder, Full Adder, Half Subtractor, Full subtractor using ICs
4. Implement parallel and serial full-adder using ICs 3 02
5. Design and development of Multiplexer and De-multiplexer using multiplexer ICs
6. Verification of the function of SR,D, JK and T Flip Flops
7. Design controlled shift registers
8. Construct a Single digit Decade Counter (0-9) with 7 segment display
9. To design a programmable Up-Down Counter with a 7 segment display.
10. Study of different memory ICs

Computer Programming Lab using C

Course Code	ITPC307
Course Title	Computer Programming Lab using C
Number of Credits	2 (L : 0, T : 0, P : 4)
Prerequisites	Interaction with DOS / Windows Operating System
Course Category	Programme Core Courses

Course Outcomes: -

After completion of the course student will be able to

- 1) Handle of Computer System properly.
- 2) Apply different logics to solve given problem.
- 3) Understand different steps and stages to develop complex program
- 4) Write program using different implementations for the same problem.
- 5) Identify different types of errors as syntax, semantic, fatal, linker & logical.
- 6) Debugging of programs.

Detailed Course Contents

Module No.	List of suggested programs/ experiments	No. of class hour
1	<ol style="list-style-type: none"> 1. Display Hello World 2. Taking input from user 3. Find ASCII value of Character 4. Use of gets() function 	4
2	<ol style="list-style-type: none"> 5. Displaying hexadecimal, decimal, octal number format of the entered numbers. 6. Displaying entered number with leading zeros and trailing zeros. 7. Displaying entered number with right and left justification. 8. Displaying with different formatting specifiers. 9. Swapping two numbers 10. To find greatest / smallest of three numbers. 11. To display pass class, second-class, distinction according to the marks entered from the keyboard. 12. To find even or odd numbers. 13. To display spellings of number 1-10 on entry. 14. Implementation and displaying the menu to execute 1. ADD, 2. SUBTRACT 3. MULTIPLICATION, 4. DIVISION using switch case. 16. Handling with unformatted, formatted files in different operational mode. 	10

3	18. To display our college name twenty times on screen. 19. To demonstrate Continue and Break statements within loop 20. structure. 21. To add first 'n' natural, even, odd numbers using different loop 22. structures. 23. To find GCD, LCM of two integral numbers. 24. To generate simple number triangle for n rows. 25. To generate Pascal triangle for n rows. 26. To add the series $1 + (1 + 2) + (1 + 2 + 3) + \dots + (1 + 2 + 3 + \dots + n)$ 27. To generate all prime numbers within the given range. 28. To find all the Armstrong numbers within 100 to 1000.	10
4	29. Display elements of array 30. Reverse an Array 31. Insert element to array 32. Find largest and smallest element in Array 33. Display two dimensional array. 34. Addition and subtraction of Matrix 35. To calculate multiplication of 2 dimensional matrix. 36. To find the number of vowels and consonants in a string. 37. Implementation of strlen(), strcpy(), strcat() and strcmp() functions. 38. To check whether a string is palindrome or not. 39. Use of all types of functions	10
5	40. Using recursion write program 41. To calculate sum of two numbers 42. To calculate factorial of any given number. 43. Display Fibonacci series 44. Reverse a string 45. Sum of Digits	6

References:

6. Programming in ANSI C, E. Balagurusamy, Tata McGraw-Hill
7. Outline of Programming with C, Byron Gottfried, Schaum, McGraw-Hill
8. Let Us C, Yashavant Kanetkar
9. Programming in C, Reema Thareja, OUP India
10. Problem Solving and Programming in C, R.S. Salaria, Khanna Publishing House
6. Programming in ANSI C, E. Balagurusamy, Tata McGraw-Hill
7. C Programming & Data Structures, B. A. Fouruzan and R. F. Gilberg, CENGAGE Learning.

Operating System Lab

Course Code	ITPC308
Course Title	Operating System Lab
Number of Credits	1 (L: 0, T: 0, P: 2)
Prerequisites	Computer Programming using C
Course Category	Programme Core Course

Course Outcome:-

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

C.O. 1: Learns Operating systems- LINUX/UNIX.(K2)

C.O. 2: Understand various UNIX commands on a standard UNIX/LINUX Operating System.(K2)

C.O. 3: Apply the scheduling algorithms for the given problem.(K3)

C.O. 4: Implement the process synchronous concept using message queue, shared memory . (K3)

C.O. 5: Implement the various methods in memory allocation and page replacement algorithm. (K3)

List of Practical's/ Activities (To perform minimum 6 practical)

1. Revision practice of various commands like man, cp, mv, ln, rm, unlink, mkdir, rmdir, etc and many more that were learnt in IT Workshop course and later.
2. Implement two way process communication using pipes.
3. Implement message queue form of IPC
4. Implement shared memory and semaphore form of IPC
5. Simulate the CPU scheduling algorithms - Round Robin, SJF, FCFS, priority
6. Simulate all FIFO Page Replacement Algorithm using C program
7. Simulate all LRU Page Replacement Algorithms using C program
8. Simulate Paging Technique of Memory Management
9. Practice various commands/utilitiessuch as catnl, uniq, tee, pg, comm, cmp, diff, tr, tar, cpio, mount, umount, find, umask, ulimit, sort, grep, egrep,fgrep cut, paste, join, du, df , ps, who, etc and many more.

Reference Books:

1. Operating System Concepts, Silberschatz, Abraham and Galvin, Peter, Wiley India Limited.
2. UNIX Concepts and Applications, Sumitabha Das, McGraw-Hill Education.
3. Operating System Concepts, Ekta Walia, Khanna Publishing House.

DATABASE MANAGEMENT LAB

Course Code	ITPC309
Course Title	Database Management 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 table and 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.Vander Lans, Pearson Education

Summer Internship-I

Course Code	ITSI-310
Course Title	Summer Internship-I
Number of Credits	2 (L: 0, T: 0, P: 0)
Prerequisites	Nil
Course Category	Internship

Internships may be full-time or part-time; they are full-time in the summer vacation and part-time during the academic session.

Sl. no.	Schedule	Duration	Activities	Credits	Hours of Work
1	Summer Vacation after 2 nd Semester	3-4 Weeks	Inter/ Intra Institutional Activities **	2	80 Hours

(** Students are required to be involved in Inter/ Intra Institutional Activities viz; Training with higher Institutions; Soft skill training organized by Training and Placement Cell of the respective Institutions; contribution at incubation/ innovation /entrepreneurship cell of the Institute; participation in conferences/ workshops/ competitions etc.; Learning at Departmental Lab/ Tinkering Lab/ Institutional workshop; Working for consultancy/ research project within the Institutes and Participation in all the activities of Institute's Innovation Council for e.g.: IPR workshop/Leadership Talks/ Idea/ Design/ Innovation/ Business Completion/ Technical Expos etc.)

Benefits to Students:

1. An opportunity to get hired by the Industry/ organization.
2. Practical experience in an organizational setting.
3. Excellent opportunity to see how the theoretical aspects learned in classes are integrated into the practical world. On-floor experience provides much more professional experience which is often worth more than classroom teaching.
4. Helps them decide if the industry and the profession is the best career option to pursue.
5. Opportunity to learn new skills and supplement knowledge.
6. Opportunity to practice communication and teamwork skills.
7. Opportunity to learn strategies like time management, multi-tasking etc. in an industrial setup.
8. Opportunity to meet new people and learn networking skills.
9. Makes a valuable addition to their resume.
10. Enhances their candidacy for higher education.
11. Creating network and social circle and developing relationships with industry people.
12. Provides opportunity to evaluate the organization before committing to a full-time position.

Course Outcome:-

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

C.O.1: Gain an exposure to real life organizational and industrial environment situations (K1).

C.O.2: Develop organizational dynamics in terms of organizational behaviour, culture and professional ethics (K1).

C.O.3: Understand the importance of Team work (K2).

C.O.4: Gain invaluable knowledge and networking experience (K2).

C.O.5: Develop skill to build a relationship with a prospective employer (K3).

Course Content:-

Internships are educational and career development opportunities, providing practical experience in a field or discipline. The Summer Internship-I is a student centric activity that would expose Technical students to the industrial environment, which cannot be simulated in the classroom and hence creating competent professionals for the industry. They are structured, short-term, supervised placements often focused around particular tasks or projects with defined timescales. An internship may be compensated, non-compensated or some time may be paid. The internship has to be meaningful and mutually beneficial to the intern and the organization. It is important that the objectives and the activities of the internship program are clearly defined and understood. Following are the intended objectives of internship training:

1. Will expose Technical students to the industrial environment, which cannot be simulated in the classroom and hence creating competent professionals for the industry.
2. Provide possible opportunities to learn, understand and sharpen the real time technical / managerial skills required at the job.
3. Exposure to the current technological developments relevant to the subject area of training.
4. Experience gained from the 'Industrial Internship' in classroom will be used in classroom discussions.
5. Create conditions conducive to quest for knowledge and its applicability on the job.
6. Learn to apply the Technical knowledge in real industrial situations.
7. Gain experience in writing Technical reports/projects.
8. Expose students to the engineer's responsibilities and ethics.
9. Familiarize with various materials, processes, products and their applications along with relevant aspects of quality control.
10. Promote academic, professional and/or personal development.
11. Expose the students to future employers.

12. Understand the social, economic and administrative considerations that influence the working environment of industrial organizations
13. Understand the psychology of the workers and their habits, attitudes and approach to problem solving.

Overall compilation of Internship Activities / Credit Framework:

Major Head of Activity	Credit	Schedule	Total Duration	Sub Activity Head	Proposed Document as Evidence	Evaluated by	Performance appraisal/ Maximum points/ activity
Inter/ Intra Institutional Activities	2	Summer Vacation after 2 nd Semester	3-4 Weeks	Inter/ Intra Institutional Workshop/ Training	Certificate	Programme Head	Satisfactory/ Good/ Excellent
				Working for consultancy/ research project	Certificate	Programme Head	Satisfactory/ Good/ Excellent
				Festival (Technical / Business / Others) Events	Certificate	Programme Head	Satisfactory/ Good/ Excellent
				Contribution in Incubation/ Innovation/ Entrepreneurship Cell/ Institutional Innovation Council	Certificate	Cell In-charge	Satisfactory/ Good/ Excellent
				Learning at Departmental Lab/Tinkering Lab/ Institutional workshop	Certificate	Cell In-charge	Satisfactory/ Good/ Excellent

STUDENT'S DIARY/ DAILY LOG:

The main purpose of writing daily diary is to cultivate the habit of documenting and to encourage the students to search for details. It develops the students' thought process and reasoning abilities. The students should record in the daily training diary the day-to-day account of the observations, impressions, information gathered and suggestions given, if any. It should contain the sketches & drawings related to the observations made by the students.

The daily training diary should be signed at the end of each day by the supervisor/ in charge of the section where the student has been working. The diary should also be shown to the Faculty Mentor visiting the industry from time to time and get ratified on the day of his visit.

Student's Diary and Internship Report should be submitted by the students along with attendance record and an evaluation sheet duly signed and stamped by the industry to the Institute immediately after the completion of the training. It will be evaluated on the basis of the following criteria:

- a) Regularity in maintenance of the diary.
- b) Adequacy & quality of information recorded.
- c) Drawings, sketches and data recorded.
- d) Thought process and recording techniques used.
- e) Organization of the information.

INTERNSHIP REPORT

After completion of Internship, the student should prepare a comprehensive report to indicate what he has observed and learnt in the training period. The student may contact Industrial Supervisor/ Faculty Mentor/TPO for assigning special topics and problems and should prepare the final report on the assigned topics. Daily diary will also help to a great extent in writing the industrial report since much of the information has already been incorporated by the student into the daily diary. The training report should be signed by the Internship Supervisor, TPO and Faculty Mentor. The Internship report will be evaluated on the basis of following criteria:

- a) Originality.
- b) Adequacy and purposeful write-up.
- c) Organization, format, drawings, sketches, style, language etc.
- d) Variety and relevance of learning experience.
- e) Practical applications, relationships with basic theory and concepts taught in the course.

Detailed Curriculum Contents of
Semester IV

SCRIPTING LANGUAGE (PYTHON)

Course Code	ITPC401
Course Title	Scripting Language (Python)
Number of Credits	3 (L: 3, T: 0, P: 0)
Prerequisites	Basic knowledge of Programming
Course Category	Programme Core Course

Course Outcomes: -

After the completion of the course Student will be able to

- 1) Draw flow charts for solving different problems, develop efficient algorithms for solving a problem. **(K3)**
- 2) Use the various constructs of Python viz. conditional, iteration**(K1)**
- 3) Write programs making judicious use of Lists, Strings, Tuples, Dictionaries wherever required**(K3)**
- 4) Manage data using NumPy **(K3)**
- 5) Handle files and Modules in Python **(K2)**

Course Content:-

Module- 1: Introduction to Programming, Algorithm and Flowcharts

Number of class hours: 04 Hrs

Suggestive Learning Outcomes:

- 1) Understand the concept and evolution of Programming. **(K1)**
- 2) Understand the concepts and purposes of algorithm and flowchart. **(K1)**
- 3) Use algorithm and flowchart to solve problem independent of language. **(K3)**
- 4) Gain knowledge of different constructs of algorithm and flowchart. **(K2)**

Detailed content of the unit: - The basic Model of computation, Algorithms, Flowcharts, Programming Languages, Compilation, Testing & debugging and documentation, Flow Chart Symbols, Basic algorithms/flowcharts for sequential processing, Decision based processing and Iterative processing.

Module- 2: Introduction to Python

Number of class hours: 05 Hrs

Suggestive Learning Outcomes:

- 1) Understand features of Python that make it one the most popular languages in the industry. **(K1)**
- 2) Understand structure of Python problem. **(K2)**
- 3) Understand the areas where Python is used. **(K2)**

Detailed content of the unit: - Python Introduction, Technical Strength of Python, Introduction to Python Interpreter and program execution, Using Comments, Literals, Constants, Python's Built-in Data types, Numbers (Integers, Floats, Complex Numbers, Real, Sets), Strings (Slicing, Indexing, Concatenation, other operations on Strings), Accepting input from Console, printing statements, Simple 'Python' programs.

Module- 3: Operators, Expressions and Python Statements, Sequence data types

Number of class hours: 8 Hrs

Suggestive Learning Outcomes:

- 1) Use the basic operators and expressions available in Python in developing program. **(K3)**
- 2) Understand and use various Python statements like conditional constructs, looping constructs in writing Python program. **(K3)**
- 3) Work with various built-in Sequence datatypes and their use. **(K3)**
- 4) Understand the concept of mutable and immutable objects. **(K2)**

Detailed content of the unit: - Assignment statement, expressions, Arithmetic, Relational, Logical, Bitwise operators and their precedence, Conditional statements: if, if-else, if-elseif-else; simple programs, Notion of iterative computation and control flow –range function, While Statement, For loop, break statement, Continue Statement, Pass statement, else, assert.

Sequence Data Types: Lists, tuples and dictionary, (Slicing, Indexing, Concatenation, other operations on Sequence datatype), concept of mutability, Examples to include finding the maximum, minimum, mean; linear search on list/tuple of numbers, and counting the frequency of elements in a list using a dictionary.

Module- 4: Functions, File Processing, Modules

Number of class hours: 8 Hrs

Suggestive Learning Outcomes:

- 1) Apply the in-built functions available in Python in solving different problems. **(K3)**
- 2) Work with modular approach using user defined functions. **(K2)**
- 3) Work with files and reading /writing onto files. **(K3)**
- 4) Understand the concept of modules and importing, loading and reloading of modules in programs. **(K1)**

Detailed content of the unit: - Functions Top-down approach of problem solving, Modular programming and functions, Function parameters, Local variables, the Return statement, DocStrings, Global statement, Default argument values, Keyword arguments, VarArgs parameters. Library functions, Time functions, Recursion, Concept of Files, File opening in various modes and closing of a file, Reading from a file, Writing onto a file, File functions, Command Line arguments, Scope of objects and Names, LEGB Rule, Module Basics, Module Files as Namespaces, Import Model, Reloading Modules.

Module- 5: NumPy Basics

Number of class hours: 05 Hrs

Suggestive Learning Outcomes:

- 1) Work on NumPy array manipulation to access data and subarrays and to split, reshape, join arrays etc. **(K3)**

Detailed content of the unit: - Introduction to NumPy, ndarray, datatypes, array attributes, array creation routines, Array from Existing Data, Array from Numerical Ranges, Indexing & Slicing.

References: - 1) Python Programming- A modular Approach (with Graphics, database, Mobile and Web Applications by Sheetal Taneja and Naveen Kumar, Pearson.

2) Head First Python by Paul Berry, O'Reilly

3) Dive into Python by Mark Pilgrim, APress

4) Beginning Programming with Python Dummies by John Paul Meuller.

5) Programming and Problem Solving Through Python Language, Prof. Satish Jain, Shashi Singh, BPB Publication.

OR

SCRIPTING LANGUAGE (PERL)

Course Code	ITPC401
Course Title	Scripting Language (Perl)
Number of Credits	3 (L: 3, T: 0, P: 0)
Prerequisites	Knowledge of Programming and Linux
Course Category	Programme Core Course

Course Outcomes: -

After the completion of the course Student will be able to

- 1) The fundamentals to create functional Perl scripts **(K1)**.
- 2) Know about data structures, flow control mechanisms, regular expressions, and subroutines and modules. **(K2)**
- 3) Know about the usage of Database Access using Perl. **(K3)**

Course Content:-

Module- 1: An Overview of Perl

Number of class hours: 08 Hrs

Suggestive Learning Outcomes:

- 1) Understand features and structure of Perl. **(K1)**
- 2) Understand the areas where Perl is used. **(K1)**
- 3) Understand the uses of Filehandles, Operators, Control Structures, Regular Expressions. **(K3)**

Detailed content of the unit: - Perl Introduction, Perl Environment, Perl Installation, Natural and Artificial Languages, A Grade Example, Filehandles, Operators, Control Structures, Regular Expressions, List Processing

Module- 2: The Gory Details

Number of class hours: 8 Hrs

Suggestive Learning Outcomes:

- 1) Use the basic operators and expressions available in Perl in developing program. **(K2)**
- 2) Understand and use various subroutines, formats in writing Perl program. **(K3)**
- 3) Work with various built-in datatypes and their use **(K3)**
- 4) Understand the concept of pattern matching, variables and hashes. **(K2)**

Detailed content of the unit: - Lexical Texture, Built-in Data Types, Terms, Pattern Matching, Operators, Statements and Declarations, Subroutines, Formats, Special Variables, Hashes

Module- 3: References and Nested Data Structures

Number of class hours: 05 Hrs

Suggestive Learning Outcomes:

- 1) Understand the concept of References, Braces, Brackets, and Quoting, **(K2)**
- 2) Understand the concept of lists and data structure codes. **(K3)**

Detailed content of the unit: - About Reference, Creating Hard References, Using Hard References, Symbolic References, Braces, Brackets, and Quoting, Manipulating Lists of Lists, Data Structure Code Examples.

Module- 4: Functions, Packages, Modules, and Object Classes

Number of class hours: 05 Hrs

Suggestive Learning Outcomes:

- 1) Work on Understand the concept of Functions. **(K2)**
- 2) Understand the concept of Modules. **(K2)**
- 3) Understand the concept of Object, Instance variables. **(K1)**
- 4) Understand the concept of Packages. **(K1)**

Detailed content of the unit: - Perl Functions by Category, Perl Functions in Alphabetical Order, Packages, Modules, Objects, Perl's Objects, Brief Refresher on Object-Oriented Programming, Using Tied Variables, About Object Design, Instance Variables, Containment, Implementation, Delegation,

Module- 5: Database Access

Number of class hours: 05 Hrs

Suggestive Learning Outcomes:

- 1) Understand the concept of Database file. **(K3)**
- 2) Understand the concept of SQL Command Using DBI and DBD. **(K3)**

Detailed content of the unit: - Making and Using a DBM File, Emptying a DBM File, Converting Between DBM Files, Merging DBM Files, Locking DBM Files, Sorting Large DBM Files, Executing an SQL Command Using DBI and DBD

References: -

- 1) Programming Perl by Larry Wall, Tom Christiansen, & Randal Schwartz; O'REILLY.
- 2) Learning Perl by Tom Phoenix, Randal L. Schwartz, O'REILLY.
- 3) Perl Cookbook by Tom Christiansen, Nathan Torkington, O'REILLY.
- 4) Perl: The Complete Reference by Martin C Brown, McGraw-Hill

Data Structures

Course Code	ITPC402
Course Title	Data Structures
Number of Credits	3 (L: 3, T: 0, P: 0)
Prerequisites	----
Course Category	Programme Core Course

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

1. Analyze the algorithms to determine the time and computation complexity and justify the correctness.
2. Implement linear Search and Binary Search algorithms
3. Scrutinize Stacks, Queues and linked list and determine their time and computation complexity.
4. Examine Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort and compare in term of Space and Time complexity
5. Investigate Graph search and traversal algorithms and determine the time and computation complexity.

Course Content:-

Module-1: Introduction to Algorithms

Number of class hours: 4 Hours

Algorithms and flow charts, Time & Space complexity.

Recursion: Basic concepts and examples of recursion e.g. factorial problem, Fibonacci sequence.

Linear Search and Binary Search Techniques and their complexity analysis.

Module- 2: Introduction to Data Structures

Number of class hours: 4 Hours

Basic Terminologies: Elementary Data Organizations, Classification of Data Structures, Data

Structure Operations: insertion, deletion, traversal etc.;

Module- 3: Stacks and Queues

Number of class hours: 10

Stacks and Queues: ADT Stack and its operations: Algorithms and their complexity analysis,

Applications of Stacks: Expression Conversion and evaluation – corresponding algorithms and

complexity analysis. ADT queue, Types of Queue: Simple Queue, Circular Queue, Priority Queue;

Operations on each types of Queues: Algorithms and their analysis.

Module- 4: Linked List

Number of class hours: 12

Linked Lists: Singly linked lists: Representation in memory, Algorithms of several operations:

Traversing, Searching, Insertion into, Deletion from linked list; Linked representation of Stack and

Queue, Header nodes, Doubly linked list: operations on it and algorithmic analysis; Circular

Linked Lists: all operations their algorithms and the complexity analysis. Trees: Basic Tree

Terminologies, Different types of Trees: Binary Tree, Threaded Binary Tree, Binary Search Tree,

AVL Tree; Tree operations on each of the trees and their algorithms with complexity analysis.

Applications of Binary Trees. B Tree, B+ Tree: definitions, algorithms and analysis.

Module- 5: Sorting and Hashing

Number of class hours: 10

Sorting and Hashing: Objective and properties of different sorting algorithms: Selection Sort,

Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort; Performance and Comparison

among all the methods, Hashing. Graph: Basic Terminologies and Representations, Graph search

and traversal algorithms and complexity analysis.

References: -

1. “Fundamentals of Data Structures”, Illustrated Edition by Ellis Horowitz, Sartaj Sahni, Computer Science Press.

2. Algorithms, Data Structures, and Problem Solving with C++”, Illustrated Edition by Mark Allen Weiss, Addison-Wesley Publishing Company
3. “How to Solve it by Computer”, 2nd Impression by R. G. Dromey, Pearson Education.

MULTIMEDIA TECHNOLOGIES

Course Code	ITPC403
Course Title	Multimedia Technologies
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 concepts of designing and developing multimedia (**K2**)
 - 2) Use the various data compression techniques (**K3**)
 - 3) Design and develop multimedia solutions (**K3**)
 - 4) Describe the basics of graphics and image data representations (**K2**)
 - 5) 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-

- 1) List the components of multimedia
- 2) Recognize different multimedia hardware and software
- 3) 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-

- 1) Use different desktop publishing software
- 2) Develop multimedia animations
- 3) 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-

- 1) Describe the concepts of representing image in Computer Systems
- 2) Recognize different types of digital images
- 3) 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 Micromedia 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)

Data Communications

Course Code	ITPC404
Course Title	Data Communications
Number of Credits	2 (L: 2, T: 0, P: 0)
Prerequisites	Fundamentals of IT
Course Category	Programme Core Course

Course Outcomes: -

1. Explain the various components of data communication. (K2)
2. Explain the fundamentals of digital communication and switching. (K2)
3. Compare and contrast data link layer protocols. (K3)
4. Summarize IEEE 802.xx standards(K1)

Course Content :-

Module- 1: Introduction

Number of class hours: 8

Introduction: Data Communications, Networks, Network Types, Internet History, Standards and Administration, Networks Models: Protocol Layering, TCP/IP Protocol suite, The OSI model, Introduction to Physical Layer-1: Data and Signals, Digital Signals, Transmission Impairment, Data Rate limits, Performance.

Module- 2: Digital Transmission

Number of class hours: 6

Digital Transmission: Digital to digital conversion (Only Line coding: Polar, Bipolar and Manchester coding).

Physical Layer-2: Analog to digital conversion (only PCM), Transmission Modes, Analog Transmission: Digital to analog conversion.

Module-3: Bandwidth Utilization

Number of class hours: 6

Bandwidth Utilization: Multiplexing and Spread Spectrum, Switching: Introduction, Circuit Switched Networks and Packet switching. Error Detection and Correction: Introduction, Block coding, Cyclic codes, Checksum

Module-4: Data link control

Number of class hours: 6

Data link control: DLC services, Data link layer protocols, Point to Point protocol (Framing, Transition phases only). Media Access control: Random Access, Controlled Access and Channelization, Introduction to Data-Link Layer: Introduction, Link-Layer Addressing, ARP IPv4 Addressing and subnetting: Classful and CIDR addressing, DHCP, NAT

Module-5: Wired LANs Ethernet

Number of class hours: 4

Wired LANs Ethernet: Ethernet Protocol, Standard Ethernet, Fast Ethernet, Gigabit Ethernet and 10 Gigabit Ethernet, Wireless LANs: Introduction, IEEE 802.11 Project and Bluetooth. Other wireless Networks: Cellular Telephony

References: -

1. Data Communication and Networking, 5th Edition, Behrouz A. Forouzan, McGrawHill.
2. Data and Computer Communication, 8th Edition, William Stallings, Pearson Prentice Hall India.
3. Communication Networks - Fundamental Concepts and Key architectures, Alberto Leon-Garcia and Indra Widjaja: Tata McGraw-Hill.
4. Data and Computer Communication, 8th Edition, William Stallings: Pearson Education.
5. Computer and Communication Networks, Nader F. Mir: Pearson Education.

SCRIPTING LANGUAGE LAB (PYTHON)

Course Code	ITPC405
Course Title	Scripting Language Lab (Python)
Number of Credits	1 (L: 0, T: 0, P: 2)
Prerequisites	Basic knowledge of Programming
Course Category	Programme Core Course

Course Outcomes: -

After the completion of the course Student will be able to

- 1) Draw flow charts for solving different problems, develop efficient algorithms for solving a problem. **(K3)**
- 2) Use the various constructs of Python viz. conditional, iteration**(K3)**
- 3) Write programs making judicious use of Lists, Strings, Tuples, Dictionaries wherever required**(K3)**
- 4) Manage data using NumPy **(K3)**

Practical Assignments:

- 1) Write a program to print all Armstrong numbers in a given range. Note: An Armstrong number is a number whose sum of cubes of digits is equal to the number itself. E.g.
 $370=3^3+7^3+0^3$
- 2) Write a function to obtain sum n terms of the following series for any positive integer value of X
 $X + X^3 / 3! + X^5 / 5! + X^7 / 7! + \dots$
- 3) Write a function to obtain sum n terms of the following series for any positive integer value of X
 $1 + x/1! + x^2/2! + x^3/3! + \dots$
- 4) Write a program to multiply two numbers by repeated addition e.g.
 $6*7 = 6+6+6+6+6+6+6$
- 5) Write a program to compute the wages of a daily labourer as per the following rules :-
Hours Worked Rate Applicable Upto first 8 hrs Rs100/-
a) For next 4 hrs Rs30/- per hr extra
b) For next 4 hrs Rs40/- per hr extra
c) For next 4 hrs Rs50/- per hr extra
d) For rest Rs60/- per hr extra
- 6) Accept the name of the labourer and no. of hours worked. Calculate and display the wages. The program should run for N number of labourers as specified by the user.
- 7) Write a function that takes a string as parameter and returns a string with every successive repetitive character replaced by? e.g. school may become school.
- 8) Write a program that takes in a sentence as input and displays the number of words, number of capital letters, no. of small letters and number of special symbols.

- 9) Write a Python program that takes list of numbers as input from the user and produces a cumulative list where each element in the list at any position n is sum of all elements at positions upto n-1.
- 10) Write a program which takes list of numbers as input and finds:
 - a) The largest number in the list
 - b) The smallest number in the list
 - c) Product of all the items in the list
- 11) Write a Python function that takes two lists and returns True if they have at least one common item.
- 12) Write a Python program to combine two dictionary adding values for common keys.
d1 = {'a': 100, 'b': 200, 'c':300}
d2 = {'a': 300, 'b': 200, 'd':400}
Sample output: Counter ({'a': 400, 'b': 400, 'd': 400, 'c': 300})
- 13) Write a program that takes sentence as input from the user and computes the frequency of each letter. Use a variable of dictionary type to maintain and show the frequency of each letter.
- 14) Write a NumPy program to find the most frequent value in an array.
- 15) Take two NumPy arrays having two dimensions. Concatenate the arrays on axis 1.
- 16) Write a function that takes two filenames f1 and f2 as input. The function should read the contents of f1 line by line and write them onto f2.

References: -

- 1) Python Programming- A modular Approach (with Graphics, database, Mobile and Web Applications by Sheetal Taneja and Naveen Kumar, Pearson.
- 2) Head First Python by Paul Berry, O'Reilly
- 3) Dive into Python by Mark Pilgrim, APress
- 4) Beginning Programming with Python Dummies by John Paul Meuller.
- 5) Programming and Problem Solving Through Python Language, Prof. Satish Jain, Shashi Singh, BPB Publication.

OR

SCRIPTING LANGUAGE LAB (PERL)

Course Code	ITPC405
Course Title	Scripting Language Lab (Perl)
Number of Credits	1 (L: 0, T: 0, P: 2)
Prerequisites	Knowledge of Programming and Linux
Course Category	Programme Core Course

Course Outcomes: -

After the completion of the course Student will be able to

- 1) The basic programming using Perl scripts (**K3**).
- 2) Know about data structures, flow control mechanisms, regular expressions, and subroutines and modules. (**K2**)

Practical Assignments:

- 1) Write a program that computes the circumference of a circle with a radius of 12.5. The circumference is 2π times the radius (and π approximates 3.141592654).
- 2) Modify the program from the previous exercise to prompt for, and accept, a radius from the person running the program.
- 3) Write a program to take in two numbers that prints out the result of the two numbers multiplied together.
- 4) Write a program that reads in a string and a number, and then prints out the string the number of times requested. (Hint: use the 'x' operator)
- 5) Write a program that reads a list of strings, and prints out the list in reverse order.
- 6) Write a program that reads in a number and a series of lines, then prints one of the lines from the list, as selected by the number.
- 7) Write a program that reads in a list of strings, then prints one chosen at random.
- 8) Write a program that asks for the temperature outside (us oldies work in Fahrenheit). The program should print **too hot** if the temperature is above 72, and **too cold** otherwise.
- 9) Write a program that reads in a list of numbers (one per line), until the number 999 is entered, then it prints the sum of all the numbers entered. Be sure not to add the 999. For example, if the numbers 1, 2, 3, 999 are entered, the answer is 6 (1+2+3).
- 10) Write a program that reads in a list of strings (on separate lines), then prints out the list in reverse order. Do this without using the reverse operator.
- 11) Write a program that reads a series of words (with one word per line) until End-Of File, and then prints a summary of how many times each word was seen.
- 12) Write a program that acts like *cat*, but reverses the order of the lines.
- 13) Construct regular expressions that match:
 - a. at least one 'a', followed by any number of 'b's
 - b. any number of back-slashes, followed by any number of stars
 - c. three consecutive copies of whatever is contained within the variable \$whatever

- d. any five characters, including the newline character
 - e. the same word written two or more times in a row, where “word” is defined as a non-empty sequence of non-whitespace characters.
- 14) Write a program that looks through **/home/kiz/test.passwd.file** (on STDIN), printing the login name and real name of each user.
 - 15) Write a program that looks through **/home/kiz/test.passwd.file** (on STDIN), for users with the same first name, and prints out those names.
 - 16) Write a program that accepts a list of words on STDIN and looks for a line containing all five vowels (specifically a,e,i,o,u). Run this this program on */usr/dict/words*. ie, run *“myprog < /usr/dict/words”*

References: -

- 1) Programming Perl by Larry Wall, Tom Christiansen, & Randal Schwartz; O’REILLY.
- 2) Learning Perl by Tom Phoenix, Randal L. Schwartz, O’REILLY.
- 3) Perl Cookbook by Tom Christiansen, Nathan Torkington, O’REILLY.
- 4) Perl: The Complete Reference by Martin C Brown, McGraw-Hill

Data structures Lab

Course Code	ITPC406
Course Title	Data structures Lab
Number of Credits	1 (L: 0, T: 0, P: 2)
Prerequisites	Data structures theory
Course Category	Programme Core Course

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

1. Compare various kinds of searching and sorting techniques
2. Construct Linear and nonlinear data structures using arrays and linked list
3. Choose appropriate data structure to solve various real-life problems
4. Originate hash tables and collision resolution Techniques level

Practical Assignments:

1. Write a menu driven C program to implement stack using one dimensional array. Perform the operations on the stack (i) Push (ii) Pop (iii) Is empty (iv) Is full (v) Display.

2. Write a menu driven C program to implement queue using one dimensional array. Perform the operations on the Queue (i) Insertion (ii) Deletion (iii) Is empty (iv) Is full (v) Display.
3. Write a C program to perform i) Infix to postfix conversion ii) Postfix evaluation

4. Write a menu driven C program to implement the following searching operations: (i) Linear Search (ii) Binary Search

5. Write a menu driven C program to implement a singly linked list and perform the following operations on it:
 - (i) Insertion a. at the beginning b. at the end c. after a specified node.
 - (ii) Deletion a. at the beginning b. at the end c. a specified node.
 - (iii) Display the linked list.
 - (iv) Search an element in the list

6. Write a menu driven C program to perform polynomial addition using linked list.

7. Write a menu driven C program to implement stack using Singly Linked list. Perform the operations on the stack (i) Push (ii) Pop (iii) Is empty (iv) Is full (v) Display.

8. Write a menu driven C program to implement Queue using Singly Linked list. Perform the operations on the Queue (i) Insertion (ii) Deletion (iii) Is empty (iv) Is full (v) Display

9. Write a menu driven program to perform (i) Bubble Sort (ii) Insertion Sort (iii) Selection Sort (iv) Quick Sort. (v) Merge Sort.

10. Write a menu driven C program to implement a binary tree using linked list and perform the following operations on it i) Insert a new node. ii) Delete a specified node. iii) Search a specified node.

11. Write a menu driven C program to implement a binary tree and perform the following traversals on it iv) In-order v) Pre order. vi) Post-order

12. Write a menu driven C program to perform the following operations on a directed graph (i) DFS (ii) BFS (iii) Display (using Adjacency Matrix).

13. Write a menu driven C program to implement hash table and the following collision resolution techniques-(i) Linear Probing (ii) Quadratic Probing (iii) Chaining

14. Write a menu driven C program to implement circular queue using arrays.

15. Write a menu driven C program to implement DEQUEUE using arrays.

15. Write a program to implement sparse matrix transpose

16. Write a menu driven C program to implement a doubly linked list and perform the following operations on it: (i) Insertion (at the beginning, at the end, after a specified node). (ii) Deletion (at the beginning, end of a specified node). (iii) Display (Forward and Backward).

17. Implement a queue and reverse the order of the queue using (i) Two additional stacks (ii) One additional queue

18. Implement a singly linked list and perform the following 65 (i) Remove all duplicate elements from the list (iii) Make a copy of the given list (i) Remove the first and last occurrence of the given element from the list

19. Write a program to create a binary tree and determine the following
I.The number of nodes in the tree
II.The sum of contents of all nodes in the tree
III.The depth of the tree

20. Write a program to implement linear search and binary search

References: -

1. Fundamentals of Data Structures in C, University Press (India).
2. Aho A. V., J. E. Hopcroft and J. D. Ullman, Data Structures and Algorithms, Pearson Publication
3. Tremblay J. P. and P. G. Sorenson, Introduction to Data Structures with Applications, Tata McGraw Hill
4. Peter Brass, Advanced Data Structures, Cambridge University Press
5. Lipschuts S., Theory and Problems of Data Structures, Schaum's Series

Software Engineering

Course Code	ITPE401-1
Course Title	Software Engineering
Number of Credits	3 (L: 3, T: 0, P: 0)
Prerequisites	NIL
Course Category	Programme Elective Course

Course Learning Objectives:

CO-1- Inculcate essential technology and software engineering knowledge and skills essential to build reasonably complex usable and maintainable software iteratively (K2).

CO-2- Emphasize on structured approach to handle software development (K3).

CO-3- Enable them to work in a small team to deliver a software system(K2).

CO-4- Demonstrate, understand, apply theories, model a basis for the software lifecycle(K3).

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

Module 1: Introduction

6 PERIODS

Learning Outcome:

Students will be able to:-

1. Define the scope of software engineering.
2. Learn the essential software engineering technique.
3. Understand the necessity of life cycle model.

Content- Introduction to Software Engineering, Lifecycle, Process Models - Traditional v/s Agile processes.

Module 2: Development Activities

6 PERIODS

Learning Outcome:

Students will be able to:-

1. Understand the exact user requirements.
2. Implement the design, coding and debugging techniques.
3. Work in team.

Content- Development Activities - Requirements Gathering and Analysis, Design Concepts, Software architecture and Architectural styles, Basic UI design, Effective Coding and Debugging techniques.

Module 3: Testing

4 PERIODS

Learning Outcome:

Students will be able to:-

1. Apply software testing knowledge and engineering methods.
2. Design and conduct a software test process for a software testing project.
3. Identify the needs of software test automation.

Content - 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: Software Quality Assurance, Verification & validation

5 PERIODS

Learning Outcome:

Students will be able to:-

1. Understand the process of applying tests to software and the fundamental components of a test case.
2. Distinguish between methods of judging test case adequacy.
3. Design test case.

Content- Software quality factors, Software quality assurance (SQA), SQA activities, Software reliability-errors and faults, software reliability models, A framework for technical software metrics.

Module 5: Project Management

4 PERIODS

Learning Outcome:

Students will be able to:-

1. Apply project management concepts and techniques to a project.
2. Explain project management in terms of the software development process.

3. Describe the responsibilities of Project manager.

Content- Project Management - Project management concepts, Configuration and Release Management, Version Control and its tools (Git), Release Planning, Change Management, Software Maintenance, Project Metrics.

Reference Books:

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. Agarwal, Yogesh Singh, New Age International Publishers

Data Mining

Course Code	ITPE401-2
Course Title	Data Mining
Number of Credits	3 (L: 3, T: 0, P: 0)
Prerequisites	Database fundamental
Course Category	Programme Elective Course

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

1. Apply the concept of Data Mining components and techniques to design data mining systems(K1)
2. Solve basic Statistical calculations on Data and perform the various aspects of data pre-processing (K3)
3. Evaluate the concept of Data Cleaning and Integration (K2)
4. Install and Configure WEKA Tool and apply data mining techniques available in WEKA(K3)
5. Identify the association rules, classification, and clusters in large data sets.(K2)

Module- 1: Fundamentals of Data Mining

Number of class hours: 4

Describe the concept of Data Mining, History, strategies, techniques, applications, challenges of data mining, Future of data mining. Types of Data: Database Data, Data Warehouses, Transactional Data, Other Kinds of Data

Module- 2: Objects, Attributes, and Statistical Description of Data

Number of class hours: 6

Explain Mining techniques and Attribute Relation File Format (ARFF) - Data Attribute, Nominal Attributes, Binary Attributes, Ordinal Attributes, Numeric Attributes, Discrete versus Continuous Attributes. Solve basic Statistical calculations on Data- Mean, Median, and Mode
Measuring the Dispersion of Data: Range, Quartiles, Variance, Standard Deviation, and Interquartile Range using WEKA

Module- 3: Aspects of Data Processing

Number of class hours: 6

Describe the aspect of data pre-processing- Pre-process the Data, Major Tasks in Data Pre-processing, Explain the concept of Data Cleaning & Integration- Missing Values, Noisy Data, Data Cleaning as a Process. Data Integration- Entity Identification Problem, Redundancy and Correlation Analysis, Tuple Duplication, Data Value Conflict Detection and Resolution, Use WEKA for cleaning and integration

Module- 4: Data Warehouse

Number of class hours: 8

Explain decision Trees - Decision tree: ID3, Probability based solving,
Data Warehouse & OLAP Technology -Data Warehouse, Differences between Operational Database Systems and Data Warehouses, Enterprise Warehouse, Data Mart, and Virtual Warehouse.

Data Mining Tool: WEKA 6. Install and Configure WEKA Tool - Basic of WEKA, Installing WEKA, WEKA data file format, Data visualization in WEKA, Data filtering, Using the concepts of data mining with WEKA

Module- 5: Cluster Analysis

Number of class hours: 6

Clustering: Problem Definition, Clustering Overview, Evaluation of Clustering Algorithms, Partitioning Clustering -K-Means Algorithm, KMeans Additional issues, PAM Algorithm; Hierarchical Clustering – Agglomerative Methods and divisive methods, Basic Agglomerative Hierarchical Clustering, Strengths and Weakness; Outlier Detection, Clustering high dimensional data, clustering Graph and Network data

References: -

1. Data Mining Concepts and Techniques Jiawei Han and Micheline Kamber Kaufmann Publishers
2. Data Mining Techniques Arun K Pujari Orient Longman Publishers
3. Fundamentals of Data Warehouses M.Jarke, M Lenzerni
4. Principles of Data Mining David Hand, HeikkiMannila, Padhraic Smyth, PHI

5. Data Mining: Methods and Techniques A B M Shawkat Ali, Saleh A, Wasimi CENGAGE Learning
6. Introduction to Data Mining, Ning Tan, Vipin Kumar, Michael Steinbanch Pang, Pearson Education

Internet of Things

Course Code	ITPE401-3
Course Title	Internet of Things
Number of Credits	3 (L: 3, T: 0, P: 0)
Prerequisites	Computer Network, Programming concept
Course Category	Programme Elective Course

Course Outcome:

1. Understand the concepts of Internet of Things (K3)
2. Analyze basic protocols in wireless sensor network (K4)
3. Design IoT applications in different domain and be able to analyse their performance(K5)
4. Implement basic IoT applications on embedded platform(K5)
5. Understand the ethical issues of IoT implementation and identifying ethical solution of any problem using IoT.

Module 1:

No of class hours: 04

Learning Outcomes of the module:

1. Illustrate what IoT is and how it works today (K3)
2. Recognise the factors that contributed to the emergence of IoT (K4)
3. Design and program IoT devices (K4)

Detailed content of the module:

- 1.1 Introduction to IoT;
- 1.2 Sensing;
- 1.3 Actuation

Module 2:

No of class hours: 07

Learning Outcomes of the module:

1. Analyse the basics of IoT networking (K4)
2. Distinguish and implement various communication protocols(K4)
3. Understand the various types of sensor network (K3)

Detailed content of the module:

- 2.1 Basics of IoT Networking,
- 2.2 Communication Protocols,

2.3 Sensor networks

Module 3

No of class hours: 7

Learning Outcomes of the module:

1. Implement various programming on the Arduino (K4)
2. Differentiate between the levels of the IoT stack (K3)
3. Familiarise with the key technologies and protocols employed at each layer of the stack(K3)

Detailed content of the module:

- 3.1 Introduction to Arduino programming
- 3.2 Integration of Sensors/Actuators to Arduino

Module 4

No of class hours: 7

Learning Outcomes of the module:

1. Design and implement the concepts of IoT with Raspberry Pi (K5)
2. Perform data analytics and draw conclusions. (K4)
3. Perform case study of the various uses of IoT in various sectors of the society(K4)

Detailed content of the module:

- 5.1 Implementation of IoT with Raspberry Pi;
- 5.2 Data Handling Analytics
- 5.3 Case Studies: Agriculture, Healthcare, Activity Monitoring

Module 5

No of class hours: 6

Learning Outcomes of the module:

1. Understand the ethical issues in IoT (K3)
2. Analyze the implementational environment and identify probable ethical solution to address any issue. (K4)

Detailed content of the module:

Ethics in IoT:

- 1.1 Characterizing the IoT, Privacy, Control – Disrupting Control, Crowd sourcing;
- 1.2 Environment – Physical thing, Electronics, Internet service;
- 1.3 Solutions – The IoT as a part of the solution, cautious optimism, the open IoT definition.

Reference Books:

1. https://nptel.ac.in/noc/individual_course.php?id=noc17-cs22
2. “The Internet of Things: Enabling Technologies, Platforms, and Use Cases”, by Pethuru Raj and Anupama C. Raman (CRC Press)
3. Internet of Things by Dr. Jeeva Jose, Khanna Publishing House (Edition 2017)
4. “Internet of Things: A Hands-on Approach”, by Arshdeep Bahga and Vijay Madisetti (Universities Press)
5. Internet of Things: Architecture and Design Principles, Raj Kamal, McGraw Hill
6. Designing the Internet of Things – Adrian McEwen & Hakim Cassimality Wiley India, ISBN: 9788126556861

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 – 1 Soft 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

Mini Project

Course Code	ITPR409
Course Title	Mini 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 thorough 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. **(K₂)**

CO 2: Understand the Vedic literature and important ideas discussed in the Vedas. **(K₂)**

CO 3: Describe scientific heritage of ancient India along with comprehending its relevance and application in various modern scientific disciplines. **(K₁)**

CO 4: Relate the theoretical and practical sides of the science of Yoga and Aurveda with modern knowledge systems. **(K₁)**

CO 5: Explain the worth of Indian intellectual heritage, traditional practices and Indian lifestyle from scientific lenses. **(K₄)**

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 -Samhitā, Yajurveda-Samhitā, Atharvaveda-Samhitā, 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 *Upaniṣads*

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: *Vedāṅgas*, Purāṇas and Dharmasāstra Literature

Number of class hours:**05**

Content:

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

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 Physics*. 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: Vidyanidhi Prakashan, 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 Pustak Bhandar, 2006.
- 11) Sinha, Jadunath. *Indian Philosophy*. Delhi: Motilal Banarsidass, 1938.
- 12) Wujastyk, Dominik. *The Roots of Ayurveda*. India: Penguin India, 2000.

Detailed Curriculum Contents of
Semester V

Object Oriented Programming using Java

Course Code	ITPC501
Course Title	Object Oriented Programming using Java
Number of Credits	3 (L: 3, T : 0, P : 0)
Prerequisites	Introduction to Programming
Course Category	Programme Core Course

Course Outcomes: -

On successful completion of this course, the student should be able to:

- 1) Understand the basic principles of the object-oriented programming. **(K2)**
- 2) Write, compile and execute Java programs. **(K3)**
- 3) Show competence in the use of the Java programming language in the development of small application programs. **(K2)**
- 4) Demonstrate an introductory understanding of graphical user interfaces and multithreaded programming. **(K2)**
- 5) Perform standard input-output operations. **(K3)**

Module 1 : Introduction to Java

Number of class hours: 5

Suggestive Learning Outcomes:

- 1) Understand basic structure of Java Program. **(K2)**
- 2) Learn basic component of Java program and use them. **(K1)**
- 3) Write simple program. **(K3)**

Detailed content of the unit:

Basics of Java programming, Data types, Variables, Operators, Control structures including selection, Looping, Java methods, Overloading, Math class, Arrays in java.

Module 2: Objects and Classes :

Number of class hours: 6

Suggestive Learning Outcomes:

- 1) Understand concept of class and object. **(K2)**
- 2) Explain use of class and objects. **(K2)**
- 3) Write methods in program. **(K3)**

Detailed content of the unit:

Basics of objects and classes in java, Constructors, Finalizer, Visibility modifiers, Methods and objects, Inbuilt classes like String, Character, StringBuffer, File, this reference.

Module 3: Inheritance and Polymorphism :

Number of class hours: 6

Suggestive Learning Outcomes:

- 1) Understand the concept of Inheritance and apply them. (K2)
- 2) Understand and apply Polymorphism. (K2)
- 3) Explain use of Interface and package. (K2)

Detailed content of the unit:

Inheritance in java, Super and sub class, Overriding, Object class, Polymorphism, Dynamic binding, Instance of operator, Abstract class, Interface in java, Package in java.

Module 4: Multithreading and Exception Handling in java :

Number of class hours: 4

Suggestive Learning Outcomes:

- 1) Explain the concept of Thread. (K2)
- 2) Create multiple threads in a program. (K3)
- 3) Learn basic idea of exception handling. (K1)

Detailed content of the unit:

Thread life cycle and methods, Runnable interface, Thread synchronization, Exception handling with try-catch-finally.

Module 5: Event, GUI programming and I/O programming:

Number of class hours: 9

Suggestive Learning Outcomes:

- 1) Understand concept of Event, GUI programming. (K2)
- 2) Write simple programs with event and GUI. (K3)
- 3) Explain Input Output operation. (K2)

Detailed content of the unit:

Event handling in java, Event types, Mouse and key events, GUI Basics, Panels, Frames, Layout Managers: Flow Layout, Border Layout, Grid Layout, GUI components like Buttons, Check Boxes, Radio Buttons, Labels, Text Fields, Text Areas, Combo Boxes, Lists, Scroll Bars, Windows, Menus, Dialog Box.

Text and Binary I/O, Binary I/O classes, Object I/O, Random Access Files.

Reference Books:

1. Introduction to Java Programming (Comprehensive Version), Daniel Liang, Seventh Edition, Pearson.
2. Programming in Java, Sachin Malhotra & Saurabh Chaudhary, Oxford University Press.
3. Programming with JAVA, E Balagurusamy, McGraw Hill Education India.
4. Core Java Volume-I Fundamentals, Eight Edition, Horstmann & Cornell, Pearson Education.
5. The Complete Reference, Java 2 (Fourth Edition), Herbert Schild, TMH.

COMPUTER NETWORKS

Course Code	ITPC502
Course Title	Computer Networks
Number of Credits	2 (L: 2, T: 0, P: 0)
Prerequisites	-
Course Category	Programme Core Course

Course Outcomes: -

After the completion of the course Student will be able to

- 1) Acquire confidence in using computers Networks, Various transmission media, their comparative study. (K1)
- 2) Categories and topologies of networks, Layered architecture (OSI and TCP/IP) and protocol suites, channel error detection and correction, MAC protocols, Ethernet. (K2)
- 3) Details of network layers and devices. (K2)
- 4) Details of IP operations in the INTERNET and associated routing principles, operations of TCP/UDP, FTP, HTTP, SMTP, SNMP, etc. (K2)

Course Content: -

Module- 1: Introduction to Computer Networks

Number of class hours: 3 Hrs

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

- 1) Understand the concept of networking, various terminologies used in Networking.
- 2) Understand various types of Networks, Network topologies
- 3) Various modes of communication

Detailed content of the unit: - Introduction: Definition of a Computer Network, Components of a computer network: Use of Computer networks; Networks for companies, Networks for

people, Social Issues: Classification of networks; Based on transmission technology, Based on their scale, Local Area Networks(LANs), Metropolitan Area Networks (MANs), Wide Area Networks(WANs), Computer topologies: Physical vs Logical Topology, Types of Topologies, Modes of communication: Simplex, Half Duplex, Full Duplex, Concept of Channel, Sender and receiver with Communication process

Module- 2: Introduction to Network layers/Models

Number of class hours: 3 Hrs

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

- 1) Network layers' concepts and its merits and de-merits
- 2) Basics of OSI model and TCP-IP protocol suite Install and configure Android app development tools

Detailed content of the unit: - Protocol hierarchy, Design issues for the layers, Merits and Demerits of Layered Architecture, Service Primitives: Reference models; The OSI Reference Model, The TCP/IP Protocol Model, Comparison of the OSI Reference Model & the TCP/IP Protocol Models, TCP/IP Protocol Suite.

Module- 3: Networking Devices

Number of class hours: 3 Hrs

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

- 1) Understand the working of various networking devices used in all Network layer

Detailed content of the unit: - Introduction; Goal of networking devices: Repeaters and their use, Hubs, Bridges, Managed vs Non Manageable switches, L-2 Switches, L-3 Switches, Stackable Switches, Concept of Collision Domain, Working of Hubs and Switches, Concept of Port Density, Concept of Broadcast Domain, Routers: Dedicated Hardware versus Server-Based Routers, Gateways: Advantages of Gateways, Gateways Functionality, Other Devices: Brouter, Proxy Server, Wireless Access Point (WAPs)/Wireless Router, Wireless LAN Extender and Wireless LAN Controller

Module- 4: Physical Layer, Data Link Layer, Network layer

Number of class hours: 8 Hrs

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

- 1) Understand how data travels physically and understand concepts of signals, transmission modes, switching techniques, various transmission media etc.

- 2) Understand function of physical layer, data framing, error detecting codes DLL-sublayers, Physical layer protocols, Wireless LAN IEEE standards.
- 3) Understand IP addressing (IPV4, IPV6), Understand Network layer protocols

Detailed content of the unit: - Introduction: Basic Functions of Physical Layer, Digital Signals: Transmission of digital Signals, Analog Signals, Transmission Impairments, Data Rate limits: Noiseless Channel: Nuyquist Bit Rate, Noisy Channel: Shannon capacity, Performance: Bandwidth, Throughput, Goodput, Latency (delay), Jitter. Concept of Serial and Parallel transmission, Switching; Circuit switching, Message switching, Packet switching, Virtual Switching, Multiplexing; FDM, WDM, TDM, Transmission Media, PSTN, Modems, DSL and other standards, Basic functions of Data Link Layer (LLC and MAC Sublayers), Framing, CRC, Checksum, Protocols: Stop and Wait, Go- Back-N, Selective Repeat, Piggybacking, HDLC, Point to Point, Multiple Access: Random Access: CSMA /CA, CSMA / CD, Controlled Access: Reservation, Polling, IPv4 Addressing, IPv4 Subnetting: CIDR, VLSM, NAT, NAT Types, IPv6, Addressing, Transition from IPv4 to IPv6, Address Mapping: ARP, RARP, BOOTP, DHCP, ICMP, ICMPv6 and IGMP, Unicast Routing Protocols

Module- 5: Transport Layer, Application Layer, Congestion Control

Number of class hours: 8 Hrs

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

- 1) Understand function of transport layer and port addressing.
- 2) Understand function of application layer and various protocols of this layer.
- 3) Understand basics of congestion in network and various congestion control techniques.

Detailed content of the unit: - Basic Functions of Transport Layer: Client server Process with Port Numbers, Concept of Socket Multiplexing vs De-multiplexing, Connectionless vs Connection Oriented, Reliable vs Unreliable, UDP, TCP, Basic Function of Application Layer, Concept of Namespace and DNS, Basics of Remote Logging (telnet and ssh), E-mail: Architecture, Introduction to SMTP, POP, IMAP protocols, File Transfer: FTP, Anonymous FTP and TFTP, Concept of www and HTTP: www, http, https protocols, Basics of Network Management System: SNMP protocol, Flow control vs. congestion control. Congestion Basics, Congestion Control: OpenLoop Closed-Loop, Concept of Quality of Service, techniques to improve QoS.

References: -

- 1) Introduction to Computer Networking by Robertazzi, Thomas G., Publisher:Springer.
- 2) Computer Networks by Andrew S. Tanenbaum, Publisher: Pearson.

3) Computer Networking -A Top-Down Approach, by Kurose James F., Ross Keith W., Publisher: Pearson.

WEB TECHNOLOGIES

Course Code	ITPC503
Course Title	Web Technologies
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) Discuss about the history and development of the World Wide Web and associated technologies (K2)
- 2) Describe The client-server architecture of the World Wide Web and its communication protocol (K2)
- 3) Implement interactive web page(s) using HTML, CSS and JavaScript (K3)
- 4) Acquire knowledge and skills for creation of web site considering both client and server side (K3)
- 5) Build Dynamic web site using server side PHP Programming and Database connectivity (K3)

Course Content:-

Module- 1: Introduction to www

Number of class hours: 5-6 Hours

Suggestive Learning Outcomes:

After completing this module students will be able to-

- 1) Recall different Networking Protocols working behind www
- 2) Set up UNIX and LINUX web servers for web application development
- 3) Describe the Web site design principles, planning the site and navigation

Detailed content of the unit: - Protocols and programs, secure connections, application and development tools, the web browser, what is server, setting up UNIX and LINUX web servers, Logging users, dynamic IP Web Design: Web site design principles, planning the site and navigation

Module- 2: Web Systems Architecture

Number of class hours: 4-5 Hours

Suggestive Learning Outcomes:

After completing this module students will be able to-

- 1) Discuss client/server (2-tier , 3-Tier) architecture
- 2) Discuss Building blocks of fast and scalable data access Concepts
- 3) Architecture of Web based systems- Describe Web Application architecture (WAA)

Detailed content of the unit: - Architecture of Web based systems- client/server (2-tier) architecture, 3-Tier architecture, Building blocks of fast and scalable data access Concepts - Caches-Proxies- Indexes-Load Balancers- Queues, Web Application architecture (WAA)

Module- 3: JavaScript

Number of class hours: 5-6 Hours

Suggestive Learning Outcomes:

After completing this module students will be able to-

- 1) Discuss about Client-side scripting and its advantages
- 2) Describe Javascript, variables, functions, conditions, loops and repetition
- 3) Create Web pages using Javascript Client-side scripting

Detailed content of the unit: - Client-side scripting, what is Javascript, simple Javascript, variables, functions, conditions, loops and repetition

Module- 4: Advance scripting

Number of class hours: 4-5 Hours

Suggestive Learning Outcomes:

After completing this module students will be able to-

- 1) Work with objects in Javascript for webpage development
- 2) Build ajax based web application
- 3) Use XML in web application development

Detailed content of the unit: - Javascript and objects, Javascript own objects, DOM and web browser environments, forms and validations DHTML: Combining HTML, CSS and Javascript, events and buttons, controlling your browser, Ajax: Introduction advantages & disadvantages, ajax based web application, alternatives of ajax XML, XSL and XSLT: Introduction to XML, uses of XML, simple XML, XML key components, DTD and Schemas, XML with application, XSL and XSLT. Introduction to Web Services

Module- 5: PHP

Number of class hours: 5-6 Hours

Suggestive Learning Outcomes:

After completing this module students will be able to-

- 1) Discuss about server-side scripting and its advantages
- 2) Create Dynamic web site using server-side PHP Programming
- 3) Build Dynamic web site for implementing Database connectivity with server-side PHP Programming

Detailed content of the unit: - server side scripting, Arrays, function and forms, advance PHP Databases :Basic command with PHP examples, Connection to server, creating database, selecting a database, listing database, listing table names creating a table, inserting data, altering tables, queries, deleting database, deleting data and tables, PHP myadmin and database bugs.

- References:** -
- 1) Web Technologies--A Computer Science Perspective”, Jeffrey C.Jackson,
 - 2) “Internet & World Wide Web How To Program”, Deitel, Deitel, Goldberg, Pearson Education
 - 3) “Web programming- Building Internet Application”, Chris Bales
 - 4) Web Applications: Concepts and Real World Design, Knuckles.

Object Oriented Programming Lab using Java

Course Code	ITPC504
Course Title	Object Oriented Programming Lab using Java
Number of Credits	L : 0, T : 0, P : 2
Prerequisites	Introduction to Programming
Course Category	Programme Core Course

Requisite: In order to write and run a Java program, a software program need to installed in the computer called Java SE Development Kit.

Course Outcomes: -

On successful completion of this course, the student should be able to:

- 1) Explain about Java programming language. (K2)
- 2) Apply their analytical skills of object-oriented programming while writing programs. (K3)
- 3) Explain and apply object-oriented design and testing involving the following concepts: data abstraction, encapsulation, information hiding, inheritance, polymorphism. (K3)
- 4) Implement basic exception handling mechanism of Java. (K3)
- 5) Write simple interactive programs using GUI and applets. (K3)

Course Content:

<u>Sl. No.</u>	<u>Topics for practice</u>
1	Program to define a structure of a basic JAVA program.
2	Program to define the data types, variable, operators, arrays and control structures.
3	Program to define class and constructors. Demonstrate constructors.

4	Program to define class, methods and objects. Demonstrate method overloading.
5	Program to demonstrate binding and polymorphism.
6	Program to define inheritance and show method overriding.
7	Program to demonstrate Packages.
8	Program to demonstrate Exception Handling.
9	Program to demonstrate Multithreading.
10	Program to demonstrate I/O operations.
11	Program to demonstrate Applet structure and event handling.
12	Program to demonstrate Layout managers.

References:

- 1) Introduction to Java Programming (Comprehensive Version), Daniel Liang, Seventh Edition, Pearson.
- 2) Programming in Java, Sachin Malhotra & Saurabh Chaudhary, Oxford University Press.
- 3) Programming with JAVA, E Balagurusamy, McGraw Hill Education India.
- 4) Core Java Volume-I Fundamentals, Eight Edition, Horstmann & Cornell, Pearson Education.
The Complete Reference, Java 2 (Fourth Edition), Herbert Schild, TMH.

WEB TECHNOLOGY LAB

Course Code	ITPC-505
Course Title	Web Technology Lab
Number of Credits	1 (L: 0, T: 0, P: 2)
Prerequisites	---
Course Category	Programme core course

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

- 1) Use LAMP Stack for web applications **(K3)**
- 2) Use Tomcat Server for Servlets and JSPs **(K3)**
- 3) Write simple applications with Technologies like HTML, JavaScript, AJAX, PHP, Servlets and JSPs **(K3)**
- 4) Connect to Database and get results **(K3)**
- 5) Parse XML files using Java (DOM and SAX parsers) Student will be able to develop/build a functional website with full features **(K3)**

Course Content:-

S.No.	Topics for Practice
1	Coding Server Client Programs
2	Developing Web Application using HTML, JavaScript
3	Developing Advanced Web Application Programs using CSS
4	Practicing PHP : Basics
5	Practicing PHP : Web Application Development
6	Practicing PHP: MySql - tiered Applications
7	Developing a fully functional Web Service Application using all the technologies learned in this course.

- References: -**
- 1) Web Technologies--A Computer Science Perspective”, Jeffrey C.Jackson,
 - 2) “Internet & World Wide Web How To Program”, Deitel, Deitel, Goldberg, Pearson Education
 - 3) “Web programming- Building Internet Application”, Chris Bales
 - 4) Web Applications: Concepts and Real World Design, Knuckles.

MOBILE APPLICATION DEVELOPMENT

Course Code	ITPE506-1
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(**K3**)

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 SQLiteOpenHelperAndroid 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.

ADVANCED DBMS

Course Code	ITPE506-2
Course Title	Advanced DBMS
Number of Credits	3 (L:3, T:0, P:0)
Prerequisites	---
Course Category	Programme Elective Course

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

- 1) Explain different DCL commands, Sequence, Index & Views (**K2**)
- 2) Explain PL/SQL basics, Exceptions, Cursors, Package & Triggers (**K2**)
- 3) Describe Functional Dependency & Decomposition (**K2**)
- 4) Utilize different Normal Forms (**K3**)
- 5) Explain Transaction & Concurrency control (**K2**)

Course Content:-

Module- 1: Advanced SQL

Number of class hours: 4-5 Hours

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

- 1) Describe the transactional controls & DCL Commands
- 2) Explain sequence & Index
- 3) Implement Views

Detailed content of the unit: - Transactional Control: Commit, Save point, Rollback; DCL Commands : Grant and Revoke; Different types of locks ; Synonym :Create synonym; Sequences: Create and alter sequences; Index :Unique and composite; Views :Create/Replace, Update and alter views.

Module- 2: PL / SQL, Cursor and Triggers

Number of class hours: 6-7 Hours

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

- 1) Explain PL/SQL basics
- 2) Explain Exception, Cursor & package
- 3) Implement triggers

Detailed content of the unit: - Basics of PL / SQL, Datatypes, Advantages, Control Structures :Conditional, Iterative, Sequential Exceptions: Predefined Exceptions ,User defined exceptions; Cursors:Static (Implicit & Explicit), Dynamic; Procedures & Functions; Packages :Package specification, Package body, Advantages of package; Fundamentals of Database Triggers; Creating Triggers; Types of Triggers :Before, after for each row, for each statements.

Module-3: Functional Dependency and Decomposition

Number of class hours: 5-6 Hours

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

- 1) Explain basics of Functional Dependency
- 2) Explain Armstrong Axioms
- 3) Explain Decomposition

Detailed content of the unit: - Basics of Functional Dependency; Functional dependency diagram and examples; Full function dependency (FFD); Armstrong's Axioms for functional dependencies; Redundant functional dependencies; Closures of a set of functional dependencies; Lossy Decomposition; Lossless join decomposition; Dependency-Preserving Decomposition.

Module-4: Normalization

Number of class hours: 4-5 Hours

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

- 1) Describe basics of Normalization
- 3) Apply different Normal Forms

Detailed content of the unit: - Basics of Normalization; Normal Forms: 1NF, 2NF, 3NF, BCNF, 4NF, 5NF.

Module- 5: Transaction Processing

Number of class hours: 5-6 Hours

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

- 1) Explain transaction
- 2) Describe Concurrency
- 3) Explain different methods of concurrency control

Detailed content of the unit: - Introduction to transaction concepts; Concurrency; Methods for Concurrency control: Locking methods, Timestamping methods, Optimistic methods.

- References:** - 1) Database Systems Concepts, design and Applications, Singh, S. K, Pearson Education
2) Sql/ Pl/SQL, Bayross, Ivan, BPB
3) An Introduction to Database Systems, Date, C. J. Pearson Education
4) Database System Concepts, Korth, Henry, MGH

Software Testing

Course Code	ITPE-506-3
Course Title	Software Testing
Number of Credits	3 (L: 3, T: 0, P: 0)
Prerequisites	Software Engineering
Course Category	Programme Elective Course

Course Outcome:-

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

- C.O.1 : Use the appropriate methods and tools for estimating software cost.(K3)
- C.O.2 : Prepare test cases for different types and levels of testing. (K3)
- C.O.3 : Prepare test plan for an application.(K3)
- C.O.4 : Test software for performance measures using automated testing tools.(K3)
- C.O.5 : Identify bugs to create defect report of given application.(K3)

Course Content:

Module 1 –Basics

Number of class hours: 6 hours

Suggestive Learning Outcomes:-

Students will be able to-

1. Understand fundamental concepts in software testing, including software testing objectives, process, criteria, strategies, and methods.
2. Describe various types of testing.
3. Identify errors and bugs in the given program
4. Validate the given application using V model in relation with quality assurance
5. Use the appropriate methods and tools for estimating software cost.

Content:

Introduction to Software Quality basics: Verification and validation, quality perspectives, Testing terminology, Software Testing Life Cycle (STLC), “V” model of Testing, QA process, cost of testing, types of tests.

Module 2 – Writing Test Cases

Number of class hours: 6 hours

Suggestive Learning Outcomes: -

Students will be able to-

1. Prepare test case for the given application.

2. Apply specified testing level for the given application.
3. Apply Acceptance testing for the given application.
4. Apply the given performance testing for the specified application.
5. Generate test cases for the given application using regression testing.

Content:

Writing test cases, Functional Testing, non-functional testing, (Performance testing), UI testing. Preparing test data, Writing Unit test, Integration test and User Acceptance Tests, preparing test scenarios from Software requirements.

Module 3 – Test Execution and Management

Number of class hours: 8 hours

Suggestive Learning Outcomes: -

Students will be able to-

1. Prepare test plan for the given application.
2. Identify the resource requirement of the given application.
3. Prepare test report of executed test cases for given application.

Content:

Test execution, Test Oracles, test planning, test strategy including when to stop testing, test-coverage

- Traceability matrix, JIRA, Bugzilla and other bug tracking tools. Test data mining, test reporting.

Module 4 – Test Automation

Number of class hours: 8 hours

Suggestive Learning Outcomes: -

Students will be able to-

1. Improved testing efficiency using automated tool for given application.
2. Identify different testing tool to test the given application.

Content:

Why automation, when not to automate, writing simple automated test cases, learn and practice any one automated testing framework like Selenium.

Module 5 – Other quality Assurance

Number of class hours: 8 hours

Suggestive Learning Outcomes:-

Students will be able to-

1. Classify defects on the basis estimated impact.

2. Prepare defect template on the given application.
3. Apply defect management process on the given application.
4. Write procedure to find defect using the given technique.

Content:

Quality and Defect management - Code reviews, Quality tools, Change management, version control.

References/ Suggested Learning Resources:-

1. Software Engineering – A Practitioner’s Approach, 7th Edition, Roger Pressman.
2. Software Testing: Principles and Practices- Desikan and G. Ramesh, PEARSON Publisher.
3. Software Testing: Principles, Techniques and Tools- Limaye, M. G. Tata McGraw Hill.
4. Software Testing: Principles and Practices -Naresh Chauhan , Oxford University Press.

Websites for Reference:

1. Bugzilla (<https://www.bugzilla.org/>)
2. JIRA (<https://www.atlassian.com/software/jira>)

MOBILE COMMUNICATION

Course Code	ITPE507-1
Course Title	Mobile Communication
Number of Credits	3 (L:3, T:0, P:0)
Prerequisites	-
Course Category	Programme Elective Course

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

- 1) Explain the basics of Cellular System **(K2)**
- 2) Explain GSM, GPRS, WLAN & Mobile IP **(K2)**
- 3) Describe WAP, WML & WLL **(K2)**
- 4) Explain 3G Technologies & Bluetooth **(K2)**
- 5) Explain the basics of 4G & 5G **(K2)**

Course Content:-

Module- 1: Introduction to cellular system

Number of class hours: 4-5 Hours

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

- 1) Describe the basics of Cellular system
- 2) Explain call setup and Hand off strategies
- 3) Explain different types of Interference

Detailed content of the unit: - Frequency reuse concept; Multiple Access Technologies for Cellular systems; Cellular system operation and Planning Principles; System Architecture; Location updating and call setup; Hand off strategies and Power control; Different types of Interference.

Module- 2: Modern wireless Communications

Number of class hours: 6-7 Hours

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

- 1) Explain GSM
- 2) Explain GPRS
- 3) Explain WLAN & Mobile IP

Detailed content of the unit: - Global System for Mobile Communication (GSM): system overview; GSM Architecture; General Packet Radio Services (GPRS): GPRS Architecture, GPRS Network Nodes; Mobile Data Communication: WLANs (Wireless LANs) IEEE 802.11 standard, Mobile IP.

Module-3: WAP, WML & WLL

Number of class hours: 5-6 Hours

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

- 1) Explain basics of WAP
- 2) Explain WML
- 3) Explain WLL Technologies

Detailed content of the unit: - Wireless Application Protocol (WAP): The Mobile Internet standard, WAP Gateway and Protocols, Wireless Mark-up Languages (WML). Wireless Local Loop(WLL): Introduction to WLL Architecture, wireless Local Loop Technologies.

Module-4: Basics of 3G & Personal Area Networks

Number of class hours: 5-6 Hours

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

- 1) Describe basics of 3G Technologies

2) Explain Bluetooth Technology & Protocols

Detailed content of the unit: - 3G: 3G W-CDMA (UMTS) (Universal mobile Telecommunication system.), 3G CDMA 2000, 3G- TD-SCDMA (synchronous); Introduction to Virtual Networks, Blue tooth technology, Blue tooth Protocols.

Module- 5: Modern advancement in communication

Number of class hours: 6-7 Hours

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

- 1) Explain basics of 4G
- 2) Describe basics of 5G

Detailed content of the unit: - 4G: Basics of 4G, Features and brief introduction to 4G Technologies; 5G: Basics of 5G, Features and brief introduction to 5G Technologies.

References: - 1) Mobile Communication, J. Schiller, Pearson
2) Pervasive Computing, Burkhardt, Pearson
3) Mobile and Personal Communication systems and services, Raj Pandya, Prentice Hall of India, 2001

Cloud Computing

Course Code	ITPE 507-2
Course Title	Cloud Computing
Number of Credits	3 (L:3, T:0, P:0)
Prerequisites	-----
Course Category	Programme Elective Course

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

1. Realize the need of cloud computing, cloud essentials, benefits, challenges, limitations, usage and applications. (K4)
2. Choose appropriate cloud models, cloud application architecture, cloud computing architecture and various infrastructure to model real world-problems (K5)
3. Compare the various cloud services and determine the security issues for the users to place the very sensitive data housed on-site (K3)
4. Illustrate the concepts of virtualization, virtual cluster and different approaches to cloud computing like Aneka, Autonomic computing engine (K3)

Module- 1: Introduction to Cloud computing

Number of Class hours:6

Learning Outcomes:

1. Demonstrate the concepts of cloud and their evolutions. (K3)
2. Investigate various cloud models and architecture. (K4)
3. Analyse the various scaling of cloud infrastructure (K3)

Detailed content of the module:

- 1.1 Evolution of cloud, Essentials, Cloud Computing definition
- 1.2 Benefits and Challenges, Limitations, Usage and Applications
- 1.3 Business Models around Cloud Computing, Characteristics, Cloud Adoption.
- 1.4 Cloud models: Introduction, Collaboration to cloud, Cloud Models
- 1.5 Cloud Applications and Architecture, Cloud Computing Architecture
- 1.6 Cloud Infrastructure Models
- 1.7 Cloud Infrastructure Self Service, Scaling a cloud infrastructure.

Module- 2: Cloud Services

Number of class hours: 6

Learning Outcomes:

1. Exemplify the various services in respect to storage and database. (K3)
2. Examine the various management scheme and security of services of the cloud. (K4)
3. Implement the testing of cloud services and the infrastructure. (K5)

Detailed content of the module:

- 2.1 Introduction to Services, Storage as a Service, Database as a Service
- 2.2 Information as Service, Process as a Service, Application as a Service
- 2.3 Management/Governance as Service, Platform as a Service, Security as a Service
- 2.4 Testing as Service, Integration as Service, Infrastructure as Service

Module- 3: Software and Service

Number of class hours: 6

Learning Outcomes:

1. Identify the aspects of device integration and the providers (K3)
2. Exemplify the concepts of various cloud file structures. (K3)
3. Differentiate the various features of Hadoop framework (K4)

Detailed content of the module:

- 3.1 Introduction, Mobile Device Integration
- 3.2 Providers, Microsoft Online Intuit Quick base

- 3.3 Cast Iron Cloud, Bungee Connect
- 3.4 Introduction to Map Reduce, Google File System,
- 3.5 Hadoop framework, Hadoop Distributed File System

Module- 4: Virtualization

Number of class hours: 6

Learning Outcomes:

1. Identify the notions of virtualization architecture along with their pros and cons.(K3)
2. Differentiate the different types of virtualization in clouds. (K4)
3. Illustrate virtual desktop infrastructure (K3)

Detailed content of the module:

- 4.1 Introduction, Pros and Cons of Virtualization
- 4.2 Virtualization Architecture, Virtualization Machine
- 4.3 Virtualization in Clusters/Grid Context, Virtual Network
- 4.4 Types of Virtualizations, Virtual Machine Monitor
- 4.5 Virtual Desktop Infrastructure.

Module- 5: Cloud architecture study & their application.

Number of class hours: 6

Learning Outcomes:

1. Identify the types of clouds and their functionalities(K3)
2. Integrate private and public clouds (K4)
3. Analyse comet cloud architecture and their applications (K4)

Detailed content of the module:

- 5.1 Cloud Computing: Introduction, Types of clouds, Cloud Comparing Approaches
- 5.2 Aneka Integration of private and public cloud, Aneka Cloud Platform
- 5.3 Introduction, Resource Provisioning Service, Aneka Hybrid Cloud Implementation
- 5.4 Comet Cloud Architecture, Autonomic Behaviour, Comet Cloud
- 5.5 Overview of Comet Cloud Based Applications, Implementation.

Reference Books: -

1. Cloud Computing, M.N RAO, PHI Learning Private Limited, ISBN: 978-81-203-5073-1
2. Cloud Computing – A practical approach for learning and implementation Pearson A. Srinivasan, J. Suresh
3. Cloud Computing A hands-on-Approach, universities Press Arshdeep Bahga and Vijay Madiseti
4. Cloud Computing – Concepts, Technology and Architecture Pearson Thomas Erl

Fundamentals of AI

Course Code	ITPE-507-3
Course Title	Fundamentals of AI
Number of Credits	3 (L:3, T:0, P:0)
Prerequisites	Basic knowledge of algorithm and searching technique.
Course Category	Programme Elective Course

Course Outcomes: -

Upon successful completion of this course, students will be able to

- 1) Demonstrate fundamental understanding of the history of artificial intelligence (AI) and its foundations. **(K1)**
- 2) Understand and implement search and game algorithms. **(K1, K2)**
- 3) Explain basic concepts, methods and theories for search. **(K2)**
- 4) Account for classical planning of proactive agents. **(K1)**
- 5) Apply basic principles of AI in solutions that require problem solving, inference, knowledge representation, and learning. **(K3)**

Module- 1: Introduction

Number of class hours: 4

After completing this module students will be able to

- 1) Understand basic concepts and history behind AI. **(K2)**
- 2) Explain Symbol system. **(K2)**
- 3) Identify agents of AI. **(K2)**

Detailed content of the unit:

Overview and Historical Perspective of AI, Turing test, Physical Symbol Systems and the scope of Symbolic AI, Agents of AI.

Module- 2: Searching

Number of class hours: 6

Suggestive Learning Outcomes:

After completing this module students will be able to

- 1) Understand basic concepts of search mechanism in AI. **(K2)**
- 2) Explain different types of Heuristic and Randomized Search. **(K2)**
- 3) Apply search in problem solving. **(K3)**

Detailed content of the unit:

Heuristic Search: Best First Search, Hill Climbing, Beam Search, Tabu Search.
Randomized Search: Simulated Annealing, Genetic Algorithms, Ant Colony Optimization.

Module-3: Path Finding Algorithms

Number of class hours: 5

After completing this module students will be able to

- 1) Explain different optimal pathfinding techniques. **(K1)**
- 2) Describe Rule based system. **(K1)**
- 3) Understand and apply game playing algorithm. **(K2)**

Detailed content of the unit:

Finding Optimal Paths: Branch and Bound, A*, IDA*, Divide and Conquer approaches, Beam Stack Search.
Problem Decomposition: Goal Trees, AO*, Rule Based Systems, Rete Net.
Game Playing: Minimax Algorithm, AlphaBeta Algorithm, SSS*.

Module-4: Planning and Constraint Satisfaction

Number of class hours: 5

After completing this module students will be able to

- 1) Understand and explain forward and backward search. **(K2)**
- 2) Understand basic concept of planning and propagation. **(K2)**

Detailed content of the unit:

Planning and Constraint Satisfaction: Domains, Forward and Backward Search, Goal Stack Planning, Plan Space Planning, Graph plan, Constraint Propagation.

Module- 5 : Logic and Inferences

Number of class hours: 5

After completing this module students will be able to

- 1) Differentiate between various types of Logic. **(K2)**
- 2) Understand and demonstrate chaining in AI. **(K2)**

Detailed content of the unit:

Logic and Inferences: Propositional Logic, First Order Logic, Soundness and Completeness, Forward and Backward chaining.

References: -

1. Deepak Khemani. A First Course in Artificial Intelligence, McGraw Hill Education (India)
2. <https://nptel.ac.in/courses/106106126/>
3. Stefan Edelkamp and Stefan Schroedl. Heuristic Search, Morgan Kaufmann.
4. Pamela McCorduck, Machines Who Think: A Personal Inquiry into the History and Prospects of Artificial Intelligence, A K Peters/CRC Press
5. Elaine Rich and Kevin Knight. Artificial Intelligence, Tata McGraw Hill.
6. Stuart Russell and Peter Norvig. Artificial Intelligence: A Modern Approach, Prentice Hall
7. M.C. Trivedi, A classical approach to Artificial Intelligence, Khanna Publishing House.

Summer Internship-II

Course Code	ITSI509
Course Title	Summer Internship-II
Number of Credits	3 (L: 0, T: 0, P: 0)
Prerequisites	Fundamental and basic practical skills of relevant discipline/programme
Course Category	Internship

Internships may be full-time or part-time; they are full-time in the summer vacation and part-time during the academic session.

Sl. no.	Schedule	Duration	Activities	Credits	Hours of Work
1	Summer Vacation after 4 th Semester	6 Weeks	Industrial/Govt./NGO/MSME/ Rural Internship/Innovation / Entrepreneurship ^{##}	3	120 Hours

(^{##}During the summer vacation after 4th Semester, students are ready for industrial experience. Therefore, they may choose to undergo Internship /Innovation /Entrepreneurship related activities. Students may choose either to work on innovation or entrepreneurial activities resulting in start-up or undergo internship with industry/ NGO's/ Government organizations/ Micro/ Small/ Medium enterprises to make themselves ready for the industry. In case a student want to pursue his/her family business and don't want to undergo internship, a declaration by a parent may be submitted directly to the TPO.)

Course Outcome: -

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

- C.O.1: Gain a better understanding of the engineering / technological workplace (K1).
- C.O.2: Develop and demonstrate workplace competencies necessary for professional and

academic success (K2).

C.O.3: Classify career preferences and professional goals (K3).

C.O.4: Develop preliminary portfolio including work samples from the internship (K2).

C.O.5: Increase competitiveness for full-time engineering employment / start-up (K3).

Course Content:-

Internships are educational and career development opportunities, providing practical experience in a field or discipline. The Summer Internship-II is a student centric activity that would expose Technical students to the industrial environment, which cannot be simulated in the classroom and hence creating competent professionals for the industry. They are structured, short-term, supervised placements often focused around particular tasks or projects with defined timescales. An internship may be compensated, non-compensated or some time may be paid. The internship has to be meaningful and mutually beneficial to the intern and the organization. It is important that the objectives and the activities of the internship program are clearly defined and understood. Following are the intended objectives of internship training:

1. Will expose Technical students to the industrial environment, which cannot be simulated in the classroom and hence creating competent professionals for the industry.
2. Provide possible opportunities to learn, understand and sharpen the real time technical / managerial skills required at the job.
3. Exposure to the current technological developments relevant to the subject area of training.
4. Experience gained from the 'Industrial Internship' in classroom will be used in classroom discussions.
5. Create conditions conducive to quest for knowledge and its applicability on the job.
6. Learn to apply the Technical knowledge in real industrial situations.
7. Gain experience in writing Technical reports/projects.
8. Expose students to the engineer's responsibilities and ethics.
9. Familiarize with various materials, processes, products and their applications along with relevant aspects of quality control.
10. Promote academic, professional and/or personal development.
11. Expose the students to future employers.
12. Understand the social, economic and administrative considerations that influence the working environment of industrial organizations
13. Understand the psychology of the workers and their habits, attitudes and approach to problem solving.

Overall compilation of Internship Activities / Credit Framework:

Major Head of Activity	Credit	Schedule	Total Duration	Sub Activity Head	Proposed Document as Evidence	Evaluated by	Performance appraisal/ Maximum points/ activity
Innovation / IPR / Entrepreneurship	3	Summer Vacation after 4 th Semester	6 Weeks	Participation in innovation related completions for eg. Hackathons etc.	Certificate	Faculty Mentor	Satisfactory/ Good/ Excellent
				Development of new product/ Business Plan/ registration of start-up	Certificate	Programme Head	Satisfactory/ Good/ Excellent
				Participation in all the activities of Institute's Innovation Council for eg: IPR workshop/ Leadership Talks/ Idea/ Design/ Innovation/ Business Completion/ Technical Expos etc.	Certificate	President/ Convener of ICC	Satisfactory/ Good/ Excellent
				Work experience at family business	Declaration by Parent	TPO	Satisfactory/ Good/ Excellent
Internship	3	Summer Vacation after 4 th Semester	6 Weeks	(Internship with Industry/ Govt. / NGO/ PSU/ Any Micro/ Small/ Medium enterprise/ Online Internship	Evaluating Report	Faculty Mentor/ TPO/ Industry supervisor	Satisfactory/ Good/ Excellent
Rural Internship	3	Summer Vacation after 4 th Semester	6 Weeks	Long Term goals under rural Internship	Evaluating Report	Faculty Mentor/ TPO/ NSS/ NCC head	Satisfactory/ Good/ Excellent

STUDENT'S DIARY/ DAILY LOG

The main purpose of writing daily diary is to cultivate the habit of documenting and to encourage the students to search for details. It develops the students' thought process and reasoning abilities. The students should record in the daily training diary the day-to-day account of the observations, impressions, information gathered and suggestions given, if any. It should contain the sketches & drawings related to the observations made by the students.

The daily training diary should be signed at the end of each day by the supervisor/ in charge of the section where the student has been working. The diary should also be shown to the Faculty Mentor visiting the industry from time to time and get ratified on the day of his visit.

Student's Diary and Internship Report should be submitted by the students along with attendance record and an evaluation sheet duly signed and stamped by the industry to the Institute immediately after the completion of the training. It will be evaluated on the basis of the following criteria:

- a) Regularity in maintenance of the diary.
- b) Adequacy & quality of information recorded.

- c) Drawings, sketches and data recorded.
- d) Thought process and recording techniques used.
- e) Organization of the information.

INTERNSHIP REPORT

After completion of Internship, the student should prepare a comprehensive report to indicate what he has observed and learnt in the training period. The student may contact Industrial Supervisor/ Faculty Mentor/TPO for assigning special topics and problems and should prepare the final report on the assigned topics. Daily diary will also help to a great extent in writing the industrial report since much of the information has already been incorporated by the student into the daily diary. The training report should be signed by the Internship Supervisor, TPO and Faculty Mentor. The Internship report will be evaluated on the basis of following criteria:

- a) Originality.
- b) Adequacy and purposeful write-up.
- c) Organization, format, drawings, sketches, style, language etc.
- d) Variety and relevance of learning experience.
- e) Practical applications, relationships with basic theory and concepts taught in the course.

Major Project (Part- I)

Course Code	ITPR-510
Course Title	Major Project (Part-I)
Number of Credits	1 (L: 0, T: 0, P: 2)
Prerequisites	Nil
Course Category	Project Work (PR)

Course Outcome:-

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

- C.O. 1: Demonstrate a sound technical knowledge of their selected project topic (K2).
- C.O. 2: Develop the skill of working in a Team (K3).
- C.O. 3: Design engineering solutions to complex problems utilising a systems approach (K6).
- C.O. 4: Design the solution of an engineering project involving latest tools and techniques (K6).
- C.O. 5: Develop the skill of effective communication with engineers and the community at large in written an oral form (K3).
- C.O. 6: Demonstrate the knowledge, skills and attitudes of a professional engineer (K2).

Course Content:-

The major 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) Develop sound knowledge about the domain of the project work.
- 2) Perform detailed study about various components of a project.
- 3) Learn to be an important member of a team for successful execution of a project work.
- 4) Study about methodologies and professional way of documentation and communication related to project work.
- 5) Develop idea about problem formulation, finding the solution of a complex engineering problem.
- 6) Develop project report as per the suggested format to communicate the findings of the project work.
- 7) Acquire the skill of effective oral communication to the fellow engineers and people in the society at large.
- 8) Knowledge of how to organize, scope, plan, do and act within a project thesis.
- 9) Familiarity with specific tools (i.e. hardware equipment and software) relevant to the project selected.
- 10) Demonstrate the implementation of a major project work.

Detailed Curriculum Contents of
Semester VI

Wireless and mobile network

Course Code	ITPC601
Course Title:	Wireless and mobile network
Number of credits	3 (L: 3, T: 0, P: 0)
Prerequisites	NIL
Course Category	Programme Core Course

Course Outcomes: After completing the course, the students will be able to

C.O.1: Explain cellular system, 2G/3G/4G/5G mobile network, Frequency reuses and channel interferences (K2).

C.O.2: Demonstrate concepts related to wireless propagation (K2).

C.O.3: Explain concepts of wireless antenna (K2).

C.O.4: Explain different multiplexing techniques (K2).

C.O.5: Illustrate the concepts and applications of Bluetooth, RFID, WLAN and WiMAX (K2).

Course Contents:

Module 1: Overview of Cellular Systems.

No. of lectures: 8

Learning Outcomes: Students will be able to explain

1. Basics of data cellular systems.
2. Evolution of 2g/3G/4G/5G mobile network concept.
3. Frequency reuses and channel interferences.

Overview of Cellular Systems, Evolution 2g/3G/4G/5G Cellular Concepts – Frequency reuse, Co channel and Adjacent channel Interference

Module 2: Wireless propagation

No. of lectures: 8

Learning Outcomes: Students will be able to explain

1. Wireless propagation, budget, loss, noise, fading and shadowing.

Wireless propagation Link budget, Free-space path loss, Noise figure of receiver Multipath fading, Shadowing, Fading margin, shadowing margin.

Module 3: Wireless Antenna

No. of lectures: 8

Learning Outcomes: Students will be able to explain

1. Types of wireless antenna.
2. Wireless channel, capacity and MIMO technology for wireless antenna.

Antenna diversity, wireless channel capacity and MIMO.

Module 4: Overview of multiplexing techniques.

No. of lectures: 6

Learning Outcomes: Students will be able to explain

1. Multiplexing and different multiplexing techniques.
2. LTE technology.

Overview of CDMA, OFDM and LTE.

Module 5: Wireless Networking Technologies.

No. of lectures: 6

Learning Outcomes: Students will be able to explain

1. Classification of Bluetooth technologies.
2. Concepts and applications of RFID
3. Demonstrate WLAN and WiMAX technologies.

Overview of Bluetooth technologies, RFID, WLAN and WiMAX.

References:

S. No.	Title of Book	Author	Publication
1	Wireless Communications – Principles and Practice	T. S. Rappaport	(2nd edition) Pearson ISBN 9788131731864
2	Modern Wireless Communications	Haykin & Moher	Pearson 2011 (Indian Edition) ISBN : 978- 8131704431

Introduction to Information Technology Management

Course Code	ITPC602
Course Title	Introduction to Information Technology Management
Number of Credits	2 (L: 2, T: 0, P: 0)
Pre-Requisites	1. Basic of Information Technology. 2. Basic knowledge of Management concepts.
Course Category	Programme Core Course

Course Outcomes: -

- 1) Explain and apply the core aspects of information technology principles and tools, and manage their implementation in a business context
- 2) To understand and be able to use frameworks and tools relating to the strategic and operational use of IT in business. Alignment of business strategy with the role and strategy for IT investments, digitization and transformation of business and organizational capability, design and implementation of IT architecture and IT governance, business process management, and supply and outsourcing relationships.
- 3) To instill skills and comfort in decision making around IT project management. The lifecycle of a project from initial need and justification through selection or development to installation and integration with existing systems to deployment and organizational changes necessary to get business value.
- 4) Analyze and synthesize business information and systems to facilitate evaluation of strategic alternatives.

Module- 1: Managing IT in a Digital World

Number of class hours: 03

Suggestive Learning Outcomes:

1. Increase knowledge about IT management
2. Understandability of IT enabled business models
3. Managerial aspect of data management.

Detailed content of the unit: - 1.1 Recent Information Technology Trends, 1.2 Managing IT in Organizations, Managing IT Resources, IT Leadership Roles, 1.3 E-Business model of the firm- Internet business models, 1.4 Managerial Issues in Managing Data-Principles in Managing Data, The Data Management Process, Data Management Policies.

Module-2: Enterprise Systems

Number of class hours: 09

Suggestive Learning Outcomes:

1. Learn (more) about Enterprise Systems- that support the entire organization
2. Understand why ERPs are useful to companies with detailed concept of ERP.

3. A basic understanding of CRM systems can help you recognize their potential for helping organizations use marketing information more effectively.
4. Develop a sound understanding of the important role of supply chain management in today's business environment
5. Clarify the fundamental terms, concepts and theories associated with Decision Support Systems

Detailed content of the unit: - 2.1 Application Areas, Critical Concepts-Batch Processing versus Online Processing, Functional Information Systems, Vertical Integration of Systems, Distributed Systems, Client/Server Systems

2.2 Basic ERP Concepts-Justifying ERP Investments-Risks of ERP-Benefits of ERP

2.3 ERP & Technology-ERP and Related Technologies-Business Intelligence (BI) and Business Analytics (BA)-E-Commerce and E-Business-Business Process Reengineering (BPR)-Data Warehousing and Data Mining-On-line Analytical Processing (OLAP)-Product Life Cycle Management (PLM)-Supply Chain Management (SCM)-Customer Relationship Management (CRM)-Geographic Information System (GIS)- Advanced Technology and ERP Security.

2.4 ERP Implementation-Implementation Challenges-ERP Implementation (Transition) Strategies- ERP Implementation Life Cycle- Requirements Definition- Implementation Methodologies-ERP Deployment Methods-Project Management and Monitoring-Post-Implementation Activities-Success and Failure Factors of an ERP Implementation

2.5 Decision Support Systems-Introduction, Understanding DSS-MIS and DSS-Decision making-types of decisions,-Data Warehouse and Data Mining-Knowledge Management Systems-Concept-Expert Systems-Concept.

Module-3: Electronic Commerce

Number of class hours: 04

Suggestive Learning Outcomes:

1. Understand the E-Commerce and E- business infrastructure and trends
2. Demonstrate an understanding of the foundations and importance of E-commerce
3. Describe Internet trading relationships including Business to Consumer, Business-to-Business, Intra-organizational.
4. Define and Describe E-business and its Models
5. Discuss various E-business Strategies

Detailed content of the unit: - 3.1 Introduction, E-commerce Technology, architectural framework-Doing business over internet- networks-Online transaction processing (OTP)-Electronic data interchange (EDI)-online payment technology- Mobile commerce- ecommerce-portals- search engines-direct selling- auctions- aggregators, 3.2 E-business-E-Business Technologies, Legal and Regulatory Environment, Strategic E-Business Opportunities (and Threats), B2B Applications, B2C Applications

Module-4: IT Project Management

Number of class hours: 05

Suggestive Learning Outcomes:

1. Define practices for effectively managing IT projects.
2. Describe some key project management concepts and the major processes of an IT project
3. Implementation techniques for managing the business risks of an IT project and managing business change.

Detailed content of the unit:-4.1 IT Portfolio Management-Project Management Roles-Project Manager-Project Initiation - Project Planning – Scheduling – Budgeting – Staffing - Planning Documents - Effort estimation - Resource allocation, Project Execution and Control-Managing Project Risks

4.2 Managing Complex IT Projects,

4.3 Managing Virtual Teams

Module-5: Planning Information Systems Resources

Number of class hours: 07

Suggestive Learning Outcomes:

1. Plans for information resources that are well aligned with an organization's business strategy today as well as its vision for tomorrow.
2. Describes some best practices for creating plans for an organization's information resources that are well aligned with its business strategy.
3. Define the importance of business manager participation in the planning of a firm's information resources
4. Formulating the Strategic IS Plan to evolve an organization's information resources from their current status toward the desired vision and architecture

Detailed content of the unit: - 5.1 Benefits of Information Resources Planning- Creating a Context for IS Resource Decisions-Aligning IS and Business Goals-Balancing the Trade-offs Between Standardization and Agility,

5.2 The Information Resources Planning Process-Assessing the current Information Resources-Measuring IS Use and Attitudes-Reviewing the IS Organizational Mission- Assessing Performance versus Goals,

5.3 Creating an Information Vision,

5.4 Designing the IT Architecture,

5.5 Formulating the Strategic IS Plan-The Strategic IS Planning Process-Tools for Identifying IT Strategic Opportunities,

5.6 Formulating Operational IS Plans,

5.7 Guidelines for Effective IS Planning

References: -

- 1) Carol V. Brown, Daniel W DeHayes, Jeffrey A. Hoffer, Wainright E. Martin, William C. Perkins, Managing Information Technology, Pearson New International Edition
- 2) Hamza Lowe, Information Technology Management, Larsen and Keller Education
- 3) Francisco Castillo, Managing Information Technology, Springer International Publishing
- 4) Alexis Leon, ERP Demystified, Tata McGraw-Hill Education
- 5) Bob Hughes, Mike Cotterell, Rajib Mall, Software Project Management, Tata McGraw-Hill Education
- 6) Adesh K. Pandey, Concepts of E-Commerce, S. K. Kataria & Sons
- 7) Janice Reynolds, The Complete E-commerce Book: Design, Build & Maintain a Successful Web-based Business, CMP Books
- 8) Syamales Maiti, Sweety Sadhukhan, E-commerce and Business Communication, Tata McGraw-Hill Education
- 9) K.K. Bajaj, Debjani Nag, E-Commerce, Tata McGraw-Hill

NETWORK AND INFORMATION SECURITY

Course Code	ITPE603-1
Course Title	Network and Information Security
Number of Credits	3 (L: 3, T: 0, P: 0)
Prerequisites	---
Course Category	Programme Elective Course

Course Outcomes: -

After the completion of the course Student will be able to

- 1) Identify different components of network, topology, protocol stacks and devices. **(K1)**
- 2) Able to acquaint with various Information security threats and mitigate such threats /incidents. **(K2)**
- 3) Explain the usage of secret key cryptography and public key cryptography algorithms used in cryptography, and applications. **(K3)**
- 4) Understand and identify the common types of attacks against networks and countermeasures. **(K3)**
- 5) Acquaint with cyber law, know Legal Aspects, Cyber Law – Indian and Internationals perspective. **(K2)**

Course Content: -

Module- 1: Network Fundamentals

Number of class hours: 6 Hrs

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

- 1) Identify different components of network devices. **(K1)**
- 2) Identify the different types of network, topologies and the most common network technologies. **(K2)**
- 3) Understand the properties and functions of network protocols and network protocol stacks. **(K2)**

Detailed content of the unit: - Introduction to Ethernet, OSI layers, TCP/IP models, Functions/ protocols & devices at each layer, Protocol headers for frame, TCP, UDP, IP, ICMP, applications layers like http, snmp etc, Network Topology, Working of Hub bridge, switch, router, UTM, remote administration of and managed network devices, Types of Networks, VLAN, Subnetting, NAT Working with Number systems, Fixed Length subnet masking, Variable Length subnet, masking, Classless Inter Domain Routing, Inter VLAN routing, Static Routing, RIP, RIPv2, OSPF, EIGRP, IGRP using IPv4, Routing in Ipv6.

Module- 2: Introduction to Information Security and Attacks

Number of class hours: 6 Hrs

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

- 1) Able to acquaint with various Information security threat and controls for it. **(K1)**
- 2) To fully understand the Principle of Least Privilege and Confidentiality, Integrity, Availability (CIA). **(K2)**
- 3) Conversant in the fundamentals of risk management, security policy, and authentication/authorization/accountability. **(K2)**

Detailed content of the unit: - Fundamentals of information security - CIA Triad, Cyber Security Controls, Logical Controls, Physical Controls, Tools & Techniques, understanding threats, attacks categories, hacking process, Vulnerability, Threat & Risk (with examples), Types of Attacks (DDOS, Phishing, Malware etc. with examples), Threats at Client systems (malware, social engineering, open ports, etc.) Threats to Network, Web, Storage & Devices, Understanding the network security, Mitigation Techniques, fundamental of web/mobile application security, Web Application Attacks (SQL Injection, Cross site scripting etc.), Mobile Application Attacks, data center security, cloud computing and data security.

Module- 3: Cryptography

Number of class hours: 8 Hrs

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

- 1) Explain the concepts used in early substitution and translation ciphers. **(K1)**
- 2) Understand Mathematical concepts underpinning cryptography. **(K3)**

- 3) Demonstrate the use of hashing in maintaining data integrity. **(K3)**
- 4) Use encryption methods that ensure both confidentiality and integrity. **(K3)**
- 5) Understand modern cryptosystem RSA, AES etc. **(K2)**

Detailed content of the unit: - Data Transmission and Organization, error detecting and correcting codes, need of cryptography. Cryptology fundamentals, Symmetric-Asymmetric cryptography & cryptographic algorithms, Private key encryption, Public key encryption, Protocols, Key management, including key generation, key storage, Key exchange, Encryption folders(Graphical/ using cipher), Data recovery agent, Symmetric key encryption algorithm, DES/3DES, IDEA,RC5, AES, Public key algorithm, RSA & ECC, Diffie-Hellman key exchange, Hash functions, MD5-message digest algorithm, SHA-1 Secure Hash algorithm, HMAC, Applications of cryptography- Secure Email PGP, SSL TLS S/MIME, File Encryption IPsec, IOT Attacks against encryption, Public Key Infrastructure Understanding digital certificates and signatures.PKI Standards and Management, X.500, X.509, ETF, IRTF.

Module- 4: Network Security and Countermeasures

Number of class hours: 6 Hrs

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

- 1) Understand and identify the common types of attacks against networks. **(K2)**
- 2) Understand the properties and functions of network protocols and the network protocol stacks. **(K2)**
- 3) Understand the aspect of deploying and utilizing wireless networks and technologies. **(K1)**
- 4) Configure firewalls, IDS, HIDS, NIDS, NIPS on all platforms for all types of attack scenarios. **(K3)**

Detailed content of the unit: - Securing Networks, Network security devices– Router, ACL, firewalls, types of firewalls, configuration and deployment, overview of IDS, Network-based IDS (NIDS), Host-based IDS, Overview of IPS, Host-based IPS, (HIPS), Network-based IPS(NIPS), UTMTMG threat management gateway, network security tools (scanners, sniffers etc) and Countermeasures. wireless security, securing wireless networks: wireless overview, Bluetooth, 820.11

Module- 5: Cyber Law and IT Act 2000

Number of class hours: 4 Hrs

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

- 1) Know Legal Aspects, Cyber Law – Indian and International perspective. **(K1)**
- 2) Able to identify types of cybercrimes and penalties associated with the crimes. **(K2)**

Detailed content of the unit: - Information Technology Act 2000 (as amended in 2008), Rules under Information Technology Act 2000. The Rule of Cyberspace. Cyber Law – Policy Issues and Emerging Trends Online Contract. Digital Signature Cyber Crime, Data Protection, Liability of Intermediary, Copyright and Internet. Domain Name Dispute, Harmful content in Internet, Case Studies.

References: -

- 1) Cryptography and Network Security Principles and Practices, William Stallings, Seventh Edition, Pearson.
- 2) Network Security Essentials: Applications and Standards Paperback, William Stallings.
- 3) Cryptography and Network Security Paperback, Atul Kahate.
- 4) Computer Networks, 5e (5th Edition) Paperback, Tanenbaum.
- 5) Principles of Computer Security: CompTIA Security+ and Beyond, W.A. Coklin, G.White, Fifth Edition.
- 6) Cyber Law-Law of Information Technology and Internet Paperback, Anirudh Rastogi

Advanced Java Programming

Course Code	ITPE-603-2
Course Title	Advanced Java Programming
Number of Credits	3 (L: 3, T: 0, P: 0)
Prerequisites	Java Programming
Course Category	PE

Course Outcome:-

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

- C.O.1 : Understand and developed Applet Programming using various techniques.(K1,K3)
- C.O.2 : Develop applications using AWT Events.(K3)
- C.O. 3 : Update and retrieve the data from the databases using JDBC-ODBC. (K3)
- C.O. 4 : Develop server side programs in the form of Servlets.(K3)
- C.O. 5 : Develop JSP applications using JSP Tags.(K3)

Course Content:

Module 1 – Java Applets

Number of class hours: 5 hours

Suggestive Learning Outcomes:-

Students will be able to-

1. Define & explain applet Life cycle.
2. Differentiate local and remote applet.

Content:

Concept of Applet Programming : Local and remote applets, difference between applet and application, Preparing to write applets, Building applet code, Applet life cycle, Creating an Executable Applet.

Module 2 – Introduction of Abstract Window Toolkit: (AWT)

Number of class hours: 7 hours

Suggestive Learning Outcomes:-

Students will be able to-

1. Describe the classes in the AWT package that relate to the Applet class.
2. Develop simple programs using Event class and Event Listener Interface .

Content:

Working with Windows and AWT : AWT classes hierarchy, Windows Fundamentals .

Working with frame windows : creating a frame window in applet, Canvas, Creating windowed program.

Event Classes: Mouse Event Class , Action Event Class, Window Event Class .

Event Listener Interface: Mouse Listener, Action Listener, Window Listener & KeyListener I .

Module 3 – Java Data Base Client/ Server

Number of class hours: 6 hours

Suggestive Learning Outcomes:-

Students will be able to-

1. Developed a program for step to connect database.
2. Describe basic of JDBC.
3. Explain the different types of JDBC drivers and their advantages and disadvantages.
4. Develop program to use JDBC to query a database and modify.

Content:

Client-Server Design: Two-Tier Database Design, Three-Tier Database Design.

The JDBC API: The API Components, Database Creation, table creation using SQL , JDBC Database Example , JDBC Drivers , JDBC-ODBC Bridge , JDBC- Advantages and Disadvantages.

Module 4 – Servlets

Number of class hours: 8 hours

Suggestive Learning Outcomes:-

Students will be able to-

1. Describe life cycle of Servlet.
2. Develop program using javax.servlet package.

Content:

The Life Cycle Of a Servlet , The Java Servlet Development Kit
The Simple Servlet: Creating and compile servlet source code, start a web browser and request the Servlet, example of echo Servlet and deployment in tomcat server ,The Servlet API, XML configuration in Tomcat .

Module 5 – Java Server Pages: (JSP)

Number of class hours: 8 hours

Suggestive Learning Outcomes:-

Students will be able to-

1. Explain JSP Architecture and its Life cycle.
2. Develop simple programs using java server pages tags.

Content:

Relation of Applets and Servlets with JSP , JSP Scripting Elements , JSP Expressions, Difference between JSP and Servlet , JSP Declarations , Simple JSP program to fetch database records .

References/ Suggested Learning Resources:-

1. Java 2 Complete Reference by Herbert Schildt (Sixth Edition)
2. Advanced Java, Jambu Krishnamurthi, Comp-U Learn Inc.
3. Mastering Enterprise Java Beans 3.0, Rima Patel, Wiley Publication.
4. Java Server Pages for Beginners, Bayross and Shah, SPD
5. Java Servlet Programming, Jason Hunter, SPD (O'Reilly)

FOSS

Course Code	ITPE603-3
Course Title	FOSS
Number of Credits	3 (L:3, T:0, P:0)
Prerequisites	-
Course Category	Programme elective course

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

- 1) Explain FOSS Philosophy and requirement (**K2**)
- 2) Install Linux (**K2**)
- 3) Explain the programming basics of Java/Python/Perl (**K2**)
- 4) Utilize different free and open source software tools (**K3**)
- 5) Perform case studies of FOSS implementation (**K3**)

Course Content:-

Module- 1: FOSS Philosophy

Number of class hours: 4-5 Hours

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

- 1) Describe the basics of FOSS Philosophy
- 2) Explain requirements of FOSS
- 3) Explain FOSS Licensing model and examples

Detailed content of the unit: - Understanding the FOSS Community and FOSS Philosophy, Benefits of Community based Software Development, Guidelines for working with FOSS community, Requirements for being open, free software, open source software, FOSS Licensing Models, FOSS examples

Module- 2: LINUX

Number of class hours: 6-7 Hours

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

- 1) Install Linux
- 2) Explain Boot process, Kernel options during Boot
- 3) Explain Windows System configuration

Detailed content of the unit: - Linux Installation and Hardware Configuration, Boot Process, Dual-Booting Linux and other Operating Systems, Kernel Options during Boot, X Windows System Configuration, System Administration (Server Administration, Backup and Restore Procedures, Strategies for keeping a Secure Server)

Module-3: Programming Languages

Number of class hours: 5-6 Hours

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

- 1) Explain LAMP
- 2) Explain the basics of Java /Python / Perl etc.
- 3) Explain the basics of Mysql, PostgreSQL or equivalent.

Detailed content of the unit: - Introduction about LAMP; Brief Introduction to Programming using languages like Java /Python / Perl; Database Systems Mysql, PostgreSQL or equivalent.

Module-4: Programming Tools and Techniques

Number of class hours: 5-6 Hours

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

- 1) Utilize Libreoffice tools, Mobile Programming
- 2) Utilize SVN, Git or equivalent.
- 3) Utilize Project Management Tools; Bug Tracking Systems; Package Management Systems etc.

Detailed content of the unit: - Libreoffice Tools; Samba: Cross platform; Open Source UML Tools; Introduction to Mobile Programming; Version Control Systems like SVN, Git or equivalent; Project Management Tools; Bug Tracking Systems; Package Management Systems

Module-5: FOSS Case Studies

Number of class hours: 7-8 Hours

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

- 1) Perform case studies of FOSS implementation

Detailed content of the unit: - Some example case studies of FOSS implementation

References: - 1) Linux in a Nutshell, by Ellen Siever

2) Philosophy of GNU URL: <http://www.gnu.org/philosophy/>.

3) Linux Administration URL: <http://www.tldp.org/LDP/lame/LAME/linux-admin-madeeasy/>.

4) Version control system URL: <http://git-scm.com/>.

5) Samba: URL : <http://www.samba.org/>.

6) Libre office: <http://www.libreoffice.org/>.

Entrepreneurship and Start-ups

Course Code	:	HS604
Course Title	:	Entrepreneurship and Start-ups
Number of Credits	:	4 (L: 3, T: 1, P: 0)
Prerequisites (Course code)	:	None
Course Category	:	HS

CO1: Understand the basic concepts of Entrepreneurship and Startups.

CO2: Illustrate skills of discovering business ideas, visualizing and planning a business.

CO3: Analyze market and business risk for strategy development.

CO4: Demonstrate skills of organizational management.

CO5: Exhibit knowledge of financing methods, institutions and skills for communication of ideas.

Course Content:

Module-1-Introduction and Basics of Entrepreneurship and Start-Ups

- Definitions, Traits of an entrepreneur, Factors influencing entrepreneurship, Types and Functions of Entrepreneurs, Need for promotion of entrepreneurship, Intrapreneur, Motivation
- Role of Entrepreneurs in Economic Development
- Similarities/differences between - Entrepreneur and Manager, Entrepreneur and Intrapreneur.

Module-2-Business Ideas and their implementation

- Discovering ideas
- Visualizing the business
- Business Plan, - Types of planning, Importance of planning, Steps in planning
- Types of Business Structures
- Institutions assisting entrepreneur

Module-3-Idea to Start-up

- Market Analysis – Identifying the target market
- Competition evaluation and Strategy Development
- Steps for starting a small enterprise
- Risk analysis

Module-4–Management of Enterprise

- Recruitment and management of talent.
- Determinants of Price, Pricing methods in practice.
- Market Positioning, Advertising and Sales Promotion
- Accounting - Understanding basics of Transaction, Journal, Ledger, Cashbook, Trial Balance, Cost Sheet and Final Accounts through simple problems

Module-5-Financing and Communication of Ideas

- Financial Institutions
- Financing methods available for start-ups in India
- Communication of Ideas to potential investors–Investor Pitch

SUGGESTED LEARNING RESOURCES:

S.No.	Title of Book	Author	Publication
1.	The Startup Owner’s Manual: The Step-by-Step Guide for Building a Great Company	Steve Blank and Bob Dorf	K & S Ranch ISBN–978-0984999392
2.	The Lean Startup: How Today’s Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses	Eric Ries	Penguin UK ISBN–978-0670921607
3.	Demand: Creating What People Love Before They Know They Want It	Adrian J. Slywotzky with Karl Weber	Headline Book Publishing ISBN–978-0755388974
4.	Entrepreneurship	Alpana Trehan	Dreamtech Press ISBN: 978-93-5004-026-3
5	Marketing and Sales Management	D C Kapoor	S Chand and Company Ltd. ISBN: 81-219-2430-8
6	Business Economics	H L Ahuja	S Chand and Company Ltd. ISBN: 81-219-1791-3
7	Financial Accounting (Principles and Practice)	Jawahar Lal & Seema Srivastava	S Chand Publishing
8	Accounting for Management	N.P. Srinivasan & Sakthivel Murugan	S Chand Publishing
9	Marketing	Harsh V Verma and Ekta Duggal	Oxford University Press ISBN: 0-19-945910-X

10	Marketing (Asian Edition)	Paul Baines, Chris Fill, Kelly Page and Piyush K. Sinha	Oxford University Press
11	Entrepreneurship	Rajeev Roy	Oxford University Press ISBN: 0-19-807263-5
12	Entrepreneurship Development	Kumar S Anil	New Age Publishers
13	Human Resource Management	Uday Kumar Haldar and Juthika Sarkar	Oxford University Press
14	Fundamentals of Entrepreneurship	S K Mohanty	Prentice Hall of India Private Limited ISBN: 81-203-2867-1
15	Entrepreneurship Development	S S khanka	S Chand and Company Ltd. ISBN: 81-219-1801-4

SUGGESTED SOFTWARE/LEARNING WEBSITES:

- a. <https://www.fundable.com/learn/resources/guides/startup>
- b. <https://corporatefinanceinstitute.com/resources/knowledge/finance/corporate-structure/>
- c. <https://www.finder.com/small-business-finance-tips>
- d. <https://www.profitbooks.net/funding-options-to-raise-startup-capital-for-your-business/>

Indian Constitution

Course Code	:	AU606
Course Title	:	Indian Constitution
Number of Credits	:	0 (L: 2, T:0; P:0)
Prerequisites (Course code)	:	None
Course Category	:	AU

Course Outcomes:

- CO1. Illustrate Preamble, Basic Structure, Fundamental Rights and Duties of Indian Constitution(K3).
- CO2. Discuss the Structure of The Indian Union Government (K2).
- CO3. Memorize the Role and Power of Governor, Chief Minister and Council of Ministers and explain the role of State Secretariat (K2).
- CO4. Describe the role of Local Administration (K2).
- CO5. Explain the Role and Functioning of Election Commission (K2).

Detailed Course Content:

Module: 1 – The Constitution – Introduction

Number of Class hours:06

Learning Outcomes:

1. Describe the History of the Making of the Indian Constitution (K2)
2. Illustrate Preamble and the Basic Structure of Indian Constitution (K3)
3. Illustrate the Fundamental Rights and Duties set by Indian Constitution (K3)

Detailed content of the unit:

1. The History of the Making of the Indian Constitution
2. Preamble and the Basic Structure, and its interpretation
3. Fundamental Rights and Duties and their interpretation
4. State Policy Principles

Module: 2 – Union Government

Number of Class hours:06

Learning Outcomes:

1. Discuss the Structure of the Indian Union Government (K2).
2. Memorize the Role and Power of President, Prime Minister and Council of Ministers of India (K1)
3. Explain the role of Lok Sabha and Rajya Sabha (K2)

Detailed content of the unit:

1. Structure of the Indian Union
2. President – Role and Power
3. Prime Minister and Council of Ministers
4. Lok Sabha and Rajya Sabha

Module: 3 – State Government

Number of Class hours:06

Learning Outcomes:

1. Memorize the Role and Power of Governor, Chief Minister and Council of Ministers of a state(K1)
2. Explain the role of State Secretariat (K2)

Detailed content of the unit:

1. Governor – Role and Power
2. Chief Minister and Council of Ministers
3. State Secretariat

Module: 4 – Local Administration

Number of Class hours:06

Learning Outcomes:

1. Describe the role of District Administration (K2)
2. Explain the role of Municipal Corporation (K2)
3. Discuss the role of Zila Panchayat (K2)

Detailed content of the unit:

1. District Administration

2. Municipal Corporation
3. Zila Panchayat

Module: 5 – Election Commission

Number of Class hours:06

Learning Outcomes:

1. Explain the Role and Functioning of Election Commission (K2)
2. Classify the role and functioning of Chief Election Commissioner and State Election Commissioner (K2).

Detailed content of the unit:

1. Role and Functioning of Election commission
2. Chief Election Commissioner
3. State Election Commission

Suggested Learning Resources:

S. No.	Title of Book	Author	Publication
1.	Ethics and Politics of the In- dian Constitution	Rajeev Bhargava	Oxford University Press, New Delhi, 2008
2.	The Constitution of India	B.L. Fadia	Sahitya Bhawan; New edition (2017)
3.	Introduction to the Consti- tution of India	DD Basu	Lexis Nexis; Twenty-Third 2018 edition

Suggested Software/Learning Websites:

- a. <https://www.constitution.org/cons/india/const.html>
- b. <http://www.legislative.gov.in/constitution-of-india>
- c. <https://www.sci.gov.in/constitution>
- d. <https://www.toppr.com/guides/civics/the-indian-constitution/the-constitution-of-india/>

Major Project (Part- II)

Course Code	ITPR607
Course Title	Major Project (Part-II)
Number of Credits	3 (L: 0, T: 0, P: 6)
Prerequisites	Nil
Course Category	Project Work (PR)

Course Outcome:-

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

- C.O. 1: Demonstrate a sound technical knowledge of their selected project topic (K2).
- C.O. 2: Develop the skill of working in a Team (K3).
- C.O. 3: Design engineering solutions to complex problems utilising a systems approach (K6).
- C.O. 4: Design the solution of an engineering project involving latest tools and techniques (K6).
- C.O. 5: Develop the skill of effective communication with engineers and the community at large in written and oral forms (K3).
- C.O. 6: Demonstrate the knowledge, skills and attitudes of a professional engineer (K2).

Course Content:-

The major 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 provide the scope to develop the following by the students-

- 1) Develop sound knowledge about the domain of the project work.
- 2) Perform detailed study about various components of a project.
- 3) Learn to be an important member of a team for successful execution of a project work.
- 4) Study about methodologies and professional way of documentation and communication related to project work.
- 5) Develop idea about problem formulation, finding the solution of a complex engineering problem.
- 6) Develop project report as per the suggested format to communicate the findings of the project work.
- 7) Acquire the skill of effective oral communication to the fellow engineers and people in the society at large.
- 8) Knowledge of how to organize, scope, plan, do and act within a project thesis.

- 9) Familiarity with specific tools (i.e. hardware equipment and software) relevant to the project selected.
- 10) Demonstrate the implementation of a major project work.

Seminar

Course Code	ITSE608
Course Title	Seminar
Number of Credits	1 (L: 0, T: 0, P: 1)
Prerequisites	Nil
Course Category	Seminar presentation

Course Outcome:-

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

- C.O.1: Demonstrate a thorough and systematic understanding of a seminar topic (K2).
 C.O. 2: Identify the methodologies and professional way of documentation and communication (K3).
 C.O. 3: Develop the communication skill as a speaker (K3).

Course Content:-

The seminar topics may be any aspect of the science and technology, entrepreneurship or any contemporary social issues to be solved by specific branch of engineering and technology (For example, Water logging problems in a particular city may be a seminar topic for Civil Engineering Students) must be approved by the instructor in advance.

The course should have the following-

- 7) Practice speaking in front of a scientific audience.
- 8) Explore topics in detail.
- 9) Research topics and organize presentations.
- 10) To improve as speakers, each student will receive feedback from the fellow students and the instructor.
- 11) PowerPoint, Key Note or overheads are acceptable media for Visual aids. Visual aids should look professional and be readable in the entire room; use spell check and proofread for typographical errors.
- 12) Students have to submit a hard copy contains detailed outline (4-5 pages) of their presentation and also a brief abstract (one or two paragraphs; **250 words max.**) describing their presentation.
- 13) Each student will give 20-minute presentations followed by 3 minutes of question-answer session.

Proposal Seminar Format for Students:

- Introduce yourself.
- Give an introduction and background information on your topic. What relevant research has been performed previously?
- State the problem(s) that remain unanswered.
- Clearly state your objectives and give the specific hypotheses you wish to test.
- Describe the methodology you will use to test your hypotheses. Be sure you fully understand your chosen methods. Give reasons why you chose these methods over other approaches.
- Present any data you have collected thus far.
- Describe what remains to be done, and what you expect to find.
- Explain the significance of your findings (or potential future findings).
