



ST. ALOYSIUS' COLLEGE JABALPUR (MADHYA PRADESH)

Autonomous, Reaccredited 'A++' Grade by NAAC (CGPA 3.58/4.00)

College with Potential for Excellence (CPE) by UGC

DST-FIST Supported & Star College Scheme by DBT

Affiliated to Rani Durgavati Vishwavidyalaya, Jabalpur (M.P.)

PART A: Introduction			
PROGRAM: Under Graduate		CLASS: B.Sc.	SEMESTER: I
SESSION:			
Subject: Computer Science			
1.	Course Code	C-1 (TH)	
2.	Course Title	Computer System Architecture	
3.	Course Type	Core Course	
4.	Pre-Requisite (if any)	To study this course, a student must have had the subject Physics/ Math in 12th class.	
5.	Course Learning Outcomes(CO)	<p>On completion of this course, learners will be able to:</p> <p>CO1. Understand the basic structure, operation and characteristics of digital computer.</p> <p>CO2. Be able to design simple combinational digital circuits based on given parameters.</p> <p>CO3. Familiarity with working of arithmetic and logic unit as well as the concept of pipelining.</p> <p>CO4. Know about hierarchical memory system including cache memories and virtual memory.</p> <p>CO5. Understand concept and advantages of parallelism, threading, multi-processors and multi-core processors.</p> <p>Know the contributions of Indians in the field of</p>	
6.	Credit Value	Theory 4 Credits	
7.	Total Marks	Max. Marks : 100	Min. Passing Marks: 35
PART B: Content of the Course			
No. of Lectures (in hours per week): 4 Hrs. per week			
Total No. of Lectures: 60 Hrs.			
Module	Topics		No. of
I	Fundamentals of Digital Electronics: Number System-Binary, Decimal, Octal, Hexa-Decimal , Conversions, Binary Arithmetic-Addition, Subtraction, Multiplication, Division, Underflow, Overflow, Sign Magnitude, Complements-1's and 2's, Fixed-Point Representation, Floating-Point Representation.		12



ST. ALOYSIUS' COLLEGE JABALPUR (MADHYA PRADESH)

Autonomous, Reaccredited 'A++' Grade by NAAC (CGPA 3.58/4.00)

College with Potential for Excellence (CPE) by UGC

DST-FIST Supported & Star College Scheme by DBT

Affiliated to Rani Durgavati Vishwavidyalaya, Jabalpur (M.P.)

II	Boolean Algebra, Reducing Boolean Expression, Logic Gates-AND, OR, NOT, Universal Gates-NAND, NOR, Analog and Digital Signals, Clock Waveform Timing, Map Simplification, K-Map-Two, Three and Four variables.	08
III	Combinational Circuits- Adder, Subtractor, Multiplexer, Demultiplexer, Decoders, Encoders. Binary Codes – Gray Codes, ASCII code, BCD code, EBCDIC, Error Detection Code and Correction Code, Hamming Code.	10
IV	Sequential Circuits - Flip - Flops, SR, D, T, JK, Master-Slave, Registers, Shift Registers- SISO, SIPO, PISO, PIPO, Counters, Instruction, Instruction Format, Instruction Codes, instructions Cycles, Addressing Modes.	10
V	Handshaking, Concepts of RISC, CISC, DMA Data Transfer, Auxiliary Memory, Cache Memory, Associative Memory, Virtual Memory, Flynn's classification - Introduction to SISD, SIMD, MISD, MIMD, Parallelism, Multicore processors.	10
Keywords/Tags: Digital Electronics, Logic Gates, Circuits, Instruction formats, Parallelism, Memory hierarchy, Multicore, Multi-threading, SISD, SIMD, MISD, MIMD.		



ST. ALOYSIUS' COLLEGE JABALPUR (MADHYA PRADESH)

Autonomous, Reaccredited 'A++' Grade by NAAC (CGPA 3.58/4.00)

College with Potential for Excellence (CPE) by UGC

DST-FIST Supported & Star College Scheme by DBT

Affiliated to Rani Durgavati Vishwavidyalaya, Jabalpur (M.P.)

PART C: Content of the Course		
No. of Lab. Practical s (in hours per week): 2 Hrs. per week		
Total No. of Labs:		
	Suggestive list of Practical	No. of
	<ol style="list-style-type: none"> 1. To study basic gates (AND, OR, NOT) and verify their truth tables. 2. To study and verify NAND as Universal gate using IC 7400. 3. To realize basic gate AND from Universal gate NAND. 4. To realize basic gate OR from Universal gate NAND. 5. To realize basic gate N OT from Universal gate NAND. 6. To study and verify NOR as Universal gate 7. To realize basic gate AND from Universal gate NOR. 8. To realize basic gate OR from Universal gate NOR. 9. To realize basic gate NOT from Universal gate NOR. 10. To study Half Adder using basic gates and verify its truth table. 11. To study Full Adder using basic gates and verify its truth table. 12. To design and construct RS flip Flop using gates and verifies the truth table. 13. To design and construct JK Flip Flop using gates and verifies the truth table. 	

Assessment and Evaluation		
Suggested Continuous Evaluation Methods:		
Maximum Marks: 100		
Continuous Comprehensive Evaluation (CCE): 30 Marks		
University Exam (UE): 70 Marks		
Internal Assessment:	Class Test Assignment/Presentation	Total Marks: 30
Continuous Comprehensive Evaluation (CCE)		
External Assessment:	Section (A): Objective Type	Total Marks: 70
University Exam (UE)	Section (B): Short Questions	
Time: 03.00 Hours	Section (C): Long Questions	



ST. ALOYSIUS' COLLEGE JABALPUR (MADHYA PRADESH)

Autonomous, Reaccredited 'A++' Grade by NAAC (CGPA 3.58/4.00)

College with Potential for Excellence (CPE) by UGC

DST-FIST Supported & Star College Scheme by DBT

Affiliated to Rani Durgavati Vishwavidyalaya, Jabalpur (M.P.)

PART A: Introduction		
PROGRAM: Under Graduate	CLASS: B.Sc.	SEMESTER: I
SESSION: 2025-26		
Subject: Computer Science		
1.	Course Code	m-1 (TH)
2.	Course Title	Computer Organization
3.	Course Type	Minor Course
4.	Pre-Requisite (if any)	To study this course, Mathematics of 12th standard is desirable.
5.	Course Learning Outcomes(CLO)	<p>On completion of this course, learners will be able to:</p> <p>CO1. Understand (Level-2) the basic structure, operation and characteristics of digital computer.</p> <p>CO2. Design (Level-6) simple combinational digital circuits based on given parameters.</p> <p>CO3. Understand (Level-2) the working of arithmetic and logic unit as well as the concept of pipelining.</p> <p>CO4. Summarize (Level-2) the hierarchical memory system including cache memories and virtual memory.</p> <p>CO5 Identify (Level-2) the contributions of Indians in the field of computer architecture and related technologies.</p> <p>Note: Level of Bloom's Taxonomy is mentioned in the brackets.</p>
6.	Credit Value	Theory 3 Credits
7.	Total Marks	Max. Marks : 30+70 =100 Min. Passing Marks: 35
PART B: Content of the Course		
No. of Lectures (in hours per week): 3 Hrs. per week		
Total No. of Lectures: 45 Hrs.		
Module	Topics	No. of Lectures
I	Vedic Mathematics in computing: Vedic methods like Nikhila Sutra and Urdhva-Tiryagbhyam, Fundamentals of Digital Electronics: Number System-Binary, Decimal, Octal, Hexa-Decimal, Conversions, Binary Arithmetic-Addition, Subtraction, Multiplication, Division, Underflow, Overflow, Sign Magnitude, Complements-1's and 2's, Fixed-Point Representation, Floating-Point Representation.	10



ST. ALOYSIUS' COLLEGE JABALPUR (MADHYA PRADESH)

Autonomous, Reaccredited 'A++' Grade by NAAC (CGPA 3.58/4.00)

College with Potential for Excellence (CPE) by UGC

DST-FIST Supported & Star College Scheme by DBT

Affiliated to Rani Durgavati Vishwavidyalaya, Jabalpur (M.P.)

II	Boolean Algebra, Reducing Boolean Expression, Logic Gates-AND, OR, NOT, Universal Gates-NAND, NOR, Analog and Digital Signals, Clock Waveform Timing, Map Simplification, K-Map-Two, Three and Four variables.	10
III	Combinational Circuits- Adder, Subtractor, Multiplexer, Demultiplexer, Decoders, Encoders. Binary Codes – Gray Codes, ASCII code, BCD code, EBCDIC, Error Detection Code and Correction Code, Hamming Code.	10
IV	Sequential Circuits - Flip - Flops, SR, D, T, JK, Master-Slave, Registers, Shift Registers- SISO, SIPO, PISO, PIPO, Counters, Instruction, Instruction Format, Instruction Codes, instructions Cycles, Addressing Modes.	10
V	Handshaking, Concepts of RISC, CISC, DMA Data Transfer, Auxiliary Memory, Cache Memory, Associative Memory, Virtual Memory, Indian Contribution.	10

Keywords/Tags: Digital Electronics, Logic Gates, Circuits, Instruction formats, Memory hierarchy.



ST. ALOYSIUS' COLLEGE JABALPUR (MADHYA PRADESH)

Autonomous, Reaccredited 'A++' Grade by NAAC (CGPA 3.58/4.00)

College with Potential for Excellence (CPE) by UGC

DST-FIST Supported & Star College Scheme by DBT

Affiliated to Rani Durgavati Vishwavidyalaya, Jabalpur (M.P.)

Assessment and Evaluation		
Suggested Continuous Evaluation Methods:		
Maximum Marks: 100		
Continuous Comprehensive Evaluation (CCE): 30 Marks		
University Exam (UE): 70 Marks		
Internal Assessment:	Class Test	Total Marks: 30
Continuous Comprehensive Evaluation (CCE)	Assignment/Presentation	
External Assessment:	Section (A): Objective Type	Total Marks: 70
University Exam (UE)	Section (B): Short Questions	
Time: 03.00 Hours	Section (C): Long Questions	

PART C: Content of the Course		
No. of Lab. Practicals (in hours per week): 2 Hrs. per week		
Total No. of Labs:		
	Suggestive list of Practical	No. of Labs.
	<ol style="list-style-type: none"> 1. To study basic gates (AND, OR, NOT) and verify their truth tables. 2. To study and verify NAND as Universal gate using IC 7400. 3. To realize basic gate AND from Universal gate NAND. 4. To realize basic gate OR from Universal gate NAND. 5. To realize basic gate NOT from Universal gate NAND. 6. To study and verify NOR as Universal gate 7. To realize basic gate AND from Universal gate NOR. 8. To realize basic gate OR from Universal gate NOR. 9. To realize basic gate NOT from Universal gate NOR. 10. To study Half Adder using basic gates and verify its truth table. 11. To study Full Adder using basic gates and verify its truth table. 12. To verify De-Morgan's First Law Theorem. 13. To verify De-Morgan's Second Law Theorem. 14. To design and construct RS flip Flop using gates and verifies the truth table. 15. To design and construct JK Flip Flop using gates and verifies the truth table. 	
	Keywords/Tags: Digital Electronics, Logic Gates, AND, OR, NOT, IC7486, IC 7400, NAND, NOR, IC 7483, Circuits, Flip Flop, De-Morgan's	



ST. ALOYSIUS' COLLEGE JABALPUR (MADHYA PRADESH)

Autonomous, Reaccredited 'A++' Grade by NAAC (CGPA 3.58/4.00)

College with Potential for Excellence (CPE) by UGC

DST-FIST Supported & Star College Scheme by DBT

Affiliated to Rani Durgavati Vishwavidyalaya, Jabalpur (M.P.)

ST. ALOYSIUS' COLLEGE(AUTONOMOUS) JABALPUR

PART A: Introduction

Program: Diploma	Session: 2025-2026	Class: B.Sc.	Semester: II
Subject: Computer Science (B.Sc.)			
1. Course Code			
2. Course Title		Programming Methodologies & Data Structures Using C++	
3. Course Type		Core Course	
4. Pre-Requisite (if any)		To study this course, Mathematics of 12th Standard is desirable.	
5. Course learning outcome	<ul style="list-style-type: none"> Here is the text written clearly and neatly, exactly as in the image, with minor grammar and formatting cleanup for readability: On completion of this course, learners will be able to: <ul style="list-style-type: none"> Develop (Level-6) simple algorithms and flowcharts to solve problems using programming based on top-down design principles. Write (Level-6) efficient and well-structured computer algorithms/programs. Formulate (Level-6) iterative solutions and array-processing algorithms for problems. Use (Level-3) recursive techniques, pointers, and searching methods in programming. Implement (Level-3) fundamental data structures and become accustomed to describing algorithms in both functional and procedural styles. Understand (Level-2) the complexity of basic operations such as insert, delete, and search on these data structures. Select appropriate (Level-5) data structures suitable for different models. Design (Level-6) programs using various data structures including hash tables, binary and general search trees, heaps, graphs, etc. Assess (Level-5) efficiency trade-offs among different data structure implementations. Implement (Level-3) and understand the applications of algorithms for searching and sorting, etc. Identify (Level-2) the contributions of Indians in the field of programming and data structures. 		
6. Credit Value	Theory—4 Credits		
7. Total Marks	Max. Marks: 30+70	Min. Passing Marks: 35	



ST. ALOYSIUS' COLLEGE JABALPUR (MADHYA PRADESH)

Autonomous, Reaccredited 'A++' Grade by NAAC (CGPA 3.58/4.00)

College with Potential for Excellence (CPE) by UGC

DST-FIST Supported & Star College Scheme by DBT

Affiliated to Rani Durgavati Vishwavidyalaya, Jabalpur (M.P.)

PART B: Content of the Course

Lectures (in hours per week): 4 Hrs. per week

Total No. of Lectures (in hours): 60 Hrs.

Module	Topics	No. of Lectures
I	<p>Relevant Indian Knowledge System (IKS) Inclusions: Algorithmic thinking in Ancient India. The Panini Grammar System (Ashtadhyayi). The Chandas Shastra (Sanskrit Prosody) a recursive structure. The Brahmagupta Algorithm (7th century CE) an introduction to zero and place value notation.</p> <p>Introduction to Programming: Program Concept, Characteristics of Programming, Stages in Program Development, Algorithms, Notations, Design, Flowcharts, Types of Programming Methodologies.</p> <p>Introduction to C++ Programming: Basic Program Structure in C++, Data Types, Variables, Constants, Operators and Basic I/O.</p> <p>Variables: Declaring, Defining and Initializing Variables, Scope of Variables, Using Named Constants, Keywords, Casting of Data Types, Operators (Arithmetic, Logical and Bitwise), Using Comments in programs, Character I/O (getc, getchar, putc, putchar etc.), Formatted and Console I/O, Simple Expressions in C++ (including Unary Operator Expressions, Binary Operator Expressions), Understanding Operators Precedence in Expressions.</p> <p>Control Statement: Conditional Statements: if construct, switch-case construct</p> <p>Iterative Statements: while, do-while, and for loops, use of break and continue in loops, Using Nested Statements (Conditional as well as Iterative).</p>	12
II	<p>Functions: Top-Down Design, Pre-defined Functions, Programmer (user) defined Functions.</p> <p>Local Variables and Global variables, Functions with Default Arguments, Call-By-Value and Call-By-Reference, Parameters, Recursion.</p> <p>Introduction to Arrays: Declaration and Referring Arrays, Arrays in Memory, Initializing Arrays. Arrays in Functions, Multi-Dimensional Arrays.</p> <p>Strings: Reading and Writing Strings, Arrays of Strings, String and Function, Strings and Structure, Standard String Library Functions.</p> <p>Pointer: Declaration of pointer variable, Pointer Arithmetic, Pointer to Pointer.</p> <p>Structures: Member Accessing, Pointers to Structures, Structures and Functions, Arrays of Structures.</p> <p>Unions: Declaration and Initialization.</p>	12
III	<p>Data Structure: Basic concepts, Linear and Non-Linear data structures.</p> <p>Algorithm Specifications: Introduction, Recursive algorithms. Data Abstraction, Performance analysis.</p> <p>Stack: Operations, Array and Linked Implementations, Applications Infix to Postfix Conversion, Postfix Expression Evaluation.</p> <p>Queue: Definition, Operations, Circular Queue-Insertion and Deletion Operations, Dequeue (Double Ended Queue), Priority</p>	12



ST. ALOYSIUS' COLLEGE JABALPUR (MADHYA PRADESH)

Autonomous, Reaccredited 'A++' Grade by NAAC (CGPA 3.58/4.00)

College with Potential for Excellence (CPE) by UGC

DST-FIST Supported & Star College Scheme by DBT

Affiliated to Rani Durgavati Vishwavidyalaya, Jabalpur (M.P.)

	Queue.	
IV	<p>Linked List: Singly Linked Lists, Operations. circularly linked lists- Operations for Circularly linked lists. Doubly Linked Lists- Operations, Application of linked list.</p> <p>Searching Algorithms: Linear Search, Binary Search.</p> <p>Sorting Algorithms: Bubble sort, Selection Sort.</p> <p>Trees: Representation of Trees. Binary tree, Properties of Binary Trees, Binary Tree Representations- Array and Linked Representations, Binary Tree Traversals, Threaded Binary Trees.</p> <p>Tree Representation in Ancient India: Genealogy (Gotra System) as an early example of hierarchical tree structures.</p>	12
V	<p>Heap: Definition, Insertion, Deletion.</p> <p>Graphs: Graph ADT, Graph Representations, Graph Traversals, Searching: BFS, DFS.</p> <p>Indian Contribution to the field: Innovations in India, origin of Julia Programming Language, Indian Engineers who designed new programming languages, open-source languages, Dr. Sartaj Sahni Computer Scientist - Pioneer of data structures, Murthy's Early Work in Software Development. Julia Programming Language's Indian Origins.)</p>	12

PART C: Learning Resources

Textbooks, Reference Books, Other Resources

Suggested Readings

Suggested Readings:

- Lipschutz: *Schaum's Outline Series – Data Structures*, Tata McGraw-Hill.
- *Problem Solving and Program Design in C*, J. R. Hanly and E. B. Koffman, Pearson, 2015.
- E. Balaguruswamy, *C++*, TMH Publication, ISBN: 0-07-462038-X.
- Herbert Schildt, *C++: The Complete Reference*, TMH Publication, ISBN: 0-07-463880-7.
- R. Lafore, *Object-Oriented Programming in C++*.
- N. Dale and C. Weems, *Programming and Problem Solving with C++ (Brief Edition)*, Jones & Bartlett Learning.
- Adam Drozdek, *Data Structures and Algorithms in C++*, Third Edition, Cengage Learning.
- Tony Gaddis, *Starting Out with Python*.
- Kenneth A. Lambert, *Fundamentals of Python*.
- Kiparsky, P. (2009). *Panini as a Formalist*.
- Joseph, G. G. (1991). *The Crest of the Peacock: Non-European Roots of Mathematics*.
- Bhaskara II (12th Century). *Lilavati and Bijaganita*.
- Staal, F. (2006). *The Science of Language and Logic in India*.
- Pingree, D. (1978). *Mathematical Astronomy in India*.
- Kosambi, D. D. (1948). *The Culture and Civilization of Ancient India*.
- Sahni, S. (2005). *Data Structures, Algorithms, and Applications in C++*.



ST. ALOYSIUS' COLLEGE JABALPUR (MADHYA PRADESH)

Autonomous, Reaccredited 'A++' Grade by NAAC (CGPA 3.58/4.00)

College with Potential for Excellence (CPE) by UGC

DST-FIST Supported & Star College Scheme by DBT

Affiliated to Rani Durgavati Vishwavidyalaya, Jabalpur (M.P.)

Suggested Online Resources:

- http://www.ndl.gov.in/he_document/ekumbh/97
- http://www.ndl.gov.in/he_document/nptel/IN_N1CSaE_9093NPDSaAuP_12265_12266
- <https://archive.nptel.ac.in/courses/106/105/106105171/>
- <https://archive.nptel.ac.in/courses/106/105/106105234/>
- <https://archive.nptel.ac.in/courses/106/101/106101208/>
- <https://archive.nptel.ac.in/courses/106/106/106106133/>
- <https://epgp.inflibnet.ac.in/Home/ViewSubject?catid=fBYcKQKJvP3a/8Vd3L08tQ==>
- <https://nptel.ac.in/courses/106105151>

Part D-Assessment and Evaluation

Suggested Continuous Evaluation Methods: Maximum Marks: 100

Continuous Comprehensive Evaluation (CCE): 30 marks University Exam (UE) 70 marks

Internal Assessment Continuous Comprehensive Evaluation (CCE)	Class Test/Assignment/Presentation and Other	Total 30
External Assessment University Exam Section	Section (A) : Objective Questions Section (B): Short Questions Section (C): Long Questions	Total 70



ST. ALOYSIUS' COLLEGE JABALPUR (MADHYA PRADESH)

Autonomous, Reaccredited 'A++' Grade by NAAC (CGPA 3.58/4.00)

College with Potential for Excellence (CPE) by UGC

DST-FIST Supported & Star College Scheme by DBT

Affiliated to Rani Durgavati Vishwavidyalaya, Jabalpur (M.P.)

ST. ALOYSIUS' COLLEGE(AUTONOMOUS) JABALPUR			
PART A: Introduction			
Program: Diploma	Session: 2025-26	Class: B.Sc.	Semester: IV
Subject: Computer Science (B.Sc.)			
8. Course Code			
9. Course Title		Programming Methodologies & Data Structures Using C++	
10. Course Type		LAB	
11. Pre-Requisite (if any)		To study this course, Mathematics of 12th Standard is desirable.	
12. Course learning outcome	On completion of this course, learners will be able to: <ol style="list-style-type: none"> 1. Develop (<i>Level-6</i>) simple algorithms and flowcharts to solve a problem with programming using top-down design principles. 2. Write (<i>Level-6</i>) efficient and well-structured computer algorithms/programs. 3. Formulate (<i>Level-6</i>) iterative solutions and array-processing algorithms for problems. 4. Apply (<i>Level-4</i>) recursive techniques, pointers, and searching methods in programming. 5. Select (<i>Level-5</i>) appropriate data structures suitable for different models. 6. Implement (<i>Level-3</i>) and understand the applications of algorithms for searching and sorting, etc. 		
13. Credit Value		Practical— 2 Credits	
14. Total Marks	Max. Marks: 100	Min. Passing Marks: 35	
PART B: Content of the Course			
Lectures (in hours per week): 1 Hrs. per week			
Total No. of Lectures (in hours): 30 Hrs.			
	Topics		No. of Labs.



ST. ALOYSIUS' COLLEGE JABALPUR (MADHYA PRADESH)

Autonomous, Reaccredited 'A++' Grade by NAAC (CGPA 3.58/4.00)

College with Potential for Excellence (CPE) by UGC

DST-FIST Supported & Star College Scheme by DBT

Affiliated to Rani Durgavati Vishwavidyalaya, Jabalpur (M.P.)

Given the problem statement, students are required to formulate the problem, develop flowcharts/algorithms, write code in C/C++, and execute and test it. Students should be given assignments on the following:

a. Learn elementary techniques involving arithmetic operators and mathematical expressions, and the appropriate use of selection (if, switch, conditional operators) and control structures.

b. Learn how to use functions and parameter passing in functions, and write recursive programs.

1. Write a program to swap the contents of two variables.
2. Write a program to find the roots of a quadratic equation.
3. Write a program to find the area of a circle, rectangle, and square using a switch case.
4. Write a program to check whether a given number is even or odd.
5. Write a program to print the table of any number.
6. Write a program to print the Fibonacci series.
7. Write a program to find the factorial of a given number.
8. Write a program to convert a decimal (integer) number into its equivalent binary number.
9. Write a program to check whether a given string is a palindrome or not.
10. Write a program to perform multiplication of two matrices.
11. Write a program to print the digits of an entered number in reverse order.
12. Write a program to print the sum of two matrices.
13. Write a program to print the multiplication of two matrices.
14. Write a program to generate even and odd series from 1 to 100.
16. Write a program to check whether a given number is prime or not.
17. Write a program for call by value and call by reference.
18. Write a program to generate the series:
 $1 + 1/1! + 2/2! + 3/3! + \dots + n/n!$
19. Write a program to create a pyramid structure:

```
*  
* *  
* * *  
* * * *
```

20. Write a program to create a pyramid structure:

```
1  
1 2  
1 2 3  
1 2 3 4
```

21. Write a program to check whether the entered number is an Armstrong number or not.
22. Write a program for traversing an array.
23. Write a program to input N numbers, add them, and find the average.
24. Write a program to find the largest element from an array.
25. Write a program for linear search.
26. Write a program for binary search.



ST. ALOYSIUS' COLLEGE JABALPUR (MADHYA PRADESH)

Autonomous, Reaccredited 'A++' Grade by NAAC (CGPA 3.58/4.00)

College with Potential for Excellence (CPE) by UGC

DST-FIST Supported & Star College Scheme by DBT

Affiliated to Rani Durgavati Vishwavidyalaya, Jabalpur (M.P.)

- | | | |
|--|--|--|
| | <p>27. Write a program for bubble sort.</p> <p>28. Write a program for selection sort.</p> | |
|--|--|--|



ST. ALOYSIUS' COLLEGE JABALPUR (MADHYA PRADESH)

Autonomous, Reaccredited 'A++' Grade by NAAC (CGPA 3.58/4.00)

College with Potential for Excellence (CPE) by UGC

DST-FIST Supported & Star College Scheme by DBT

Affiliated to Rani Durgavati Vishwavidyalaya, Jabalpur (M.P.)

Faculty of Science

Bachelor of Science

BSc.(CS) II Semester

Paper-Major II

Operating System and Office Automation

Course Outcomes

CO. No.	Course Outcomes	Cognitive Level
CO 1	Describe the importance of computer system resources and the role of operating systems	U
CO 2	To understand the concept of office automation.	U
CO 3	To understand the basic concepts of various application software.	U, An
CO 4	To specify the objectives of modern operating systems and describe how operating systems have evolved over time	K, An
CO 5	To Understand various process management concepts and can compare various scheduling techniques, synchronization, and deadlocks.	Understand
CO 6	To know India's Contribution towards computing, knowledge structuring, and resource management techniques.	Understand

Credit and Marking Scheme

	Credits	Marks		Total Marks
		Internal	External	
Theory	4	30	70	100
Practical	2	30	70	100
Total	6		200	

Evaluation Scheme

	Marks	
	Internal	External
Theory	3 Internal Exams of 15 Marks (During the Semester) (Best 2 will be taken)	1 External Exams (At the End of Semester)
Practical	3 Internal Exams (During the Semester) (Best 2 will be taken)	1 External Exams (At the End of Semester)



ST. ALOYSIUS' COLLEGE

JABALPUR (MADHYA PRADESH)

Autonomous, Reaccredited 'A++' Grade by NAAC (CGPA 3.58/4.00)

College with Potential for Excellence (CPE) by UGC

DST-FIST Supported & Star College Scheme by DBT

Affiliated to Rani Durgavati Vishwavidyalaya, Jabalpur (M.P.)

BSc. II Semester

Paper-Major , Operating System & Office Automation

Content of the Course

Theory

Total No. of Lectures: 60 Hrs.

Maximum Marks: 70

Unit	Topics	No. of Lecture
I	Introduction to Operating System : Definition, Function, Evolution, Types (Batch, Multiprogramming, Time – Sharing, Distributed, Real- Time, Embedded). Resource allocation concept in Indian Philosophy: Pancha Kosha theory – Layered abstraction akin to OS design, Manuscript storage in ancient Libraries (Takshashila & Nalanda) as an analogy for memory management.	12
II	Process Management : Process Concept, Process Scheduling (e.g. FCFS , SJF , Round Robin , Priority Scheduling, Threads, Inter-Process Communication (IPC). Concurrency & Synchronization : Process Synchronization, Critical sections, Deadlocks (Prevention, Avoidance, Detection) , Semaphores, CPU Scheduling.	12
III	Memory Management: Memory Hierarchy, Virtual Memory, Paging, Segmentation, Fragmentation, Thrashing. File systems & I/O Management: File Organization, Allocation methods (Contiguous, Linked, Indexed) , Directory structure, Disk Scheduling (FCFS, SSTF, SCAN, LOOK)	12
IV	Office Productivity tools : Word Processing, Spreadsheet, Presentation, Database management, Email & Collaboration tools. Security & Virtualization : Basics of Computer Security, User Authentication, Access Control, Cloud Computing, Virtual	12
V	Indian Contribution to Operating System & Computing: Achievements of Raj Reddy (AI & Speech Recognition, Pravin Bhagat (Wi-Fi Protocols), Satyam Priyadarshy (Cloud Computing) And Indian Roles in Open Source. India's innovations in software development, networking and artificial intelligence.	12

References

Textbooks:

- 1.A Silberschatz, P.B. Galvin, G. Gagne, Operating Systems Concepts, 8th Edition, John Wiley Publications.
- 2.A. S. Tanenbaum, Modern Operating Systems, 3rd Edition, Pearson Education.
3. Operating System by Peterson.

Reference Books:

- 1.G. Nutt, Operating Systems: A Modern Perspective, 2nd Edition Pearson Education.
2. W. Stallings, Operating Systems, Internals & Design Principles, 8th Edition, Pearson Education.
3. M. Milenkovic, Operating Systems- Concepts and design, Tata McGraw Hill.



ST. ALOYSIUS' COLLEGE JABALPUR (MADHYA PRADESH)

Autonomous, Reaccredited 'A++' Grade by NAAC (CGPA 3.58/4.00)

College with Potential for Excellence (CPE) by UGC

DST-FIST Supported & Star College Scheme by DBT

Affiliated to Rani Durgavati Vishwavidyalaya, Jabalpur (M.P.)

List of Practical

1. Create a document and apply different Editing options.
2. Create a banner for your college.
3. Implement Mail Merge in MS-Word.
4. Design your class timetable in MS-Excel.
5. Prepare a bar chart & pie chart for analysis of the election results.
6. Work on the following exercises on a Workbook:
 - i. Copy an existing Sheet
 - ii. Rename the old Sheet
 - iii. Insert a new Sheet into an existing Workbook
 - iv. Delete the renamed Sheet.
7. Design a presentation illustrating the insertion of pictures, Word Art and ClipArt in PowerPoint.
8. Design a presentation using charts and tables of the marks obtained in class in PowerPoint.
9. Create and manage databases in MS Access.
10. Perform the following Linux Commands: pwd, ls, cd, cd .., mkdir, touch, cp, mv, rm, cat, grep "pattern" <file>, | (pipe), echo, chmod <permissions> <file>, man <command>, Shell scripting in Linux.



ST. ALOYSIUS' COLLEGE JABALPUR (MADHYA PRADESH)

Autonomous, Reaccredited 'A++' Grade by NAAC (CGPA 3.58/4.00)

College with Potential for Excellence (CPE) by UGC

DST-FIST Supported & Star College Scheme by DBT

Affiliated to Rani Durgavati Vishwavidyalaya, Jabalpur (M.P.)

Faculty of Science

Bachelor of Science (B.Sc.), II Semester

SUBJECT: COMPUTER SCIENCE

Paper-Minor

Introduction to Programming Methodologies

Course Outcomes

CO. No.	Course Outcomes	Cognitive Level
CO 1	Develop simple algorithms and flow charts to solve a problem with programming using top-down design principles.	U, A
CO 2	Writing efficient and well-structured computer algorithms/programs.	U
CO 3	Formulate iterative solutions and array processing algorithms for problems.	U
CO 4	Use recursive techniques, pointers and searching methods in programming	U, A

Credit and Marking Scheme

	Credits	Marks		Total Marks
		Internal	External	
Theory	3	30	70	100
Practical	1	30	70	100
Total	4			200

Evaluation Scheme

	Marks	
	Internal	External
Theory	3 Internal Exams of 20 Marks (During the Semester) (Best 2 will be taken)	1 External Exams (At the End of Semester)
Practical	3 Internal Exams (During the Semester) (Best 2 will be taken)	1 External Exams (At the End of Semester)



ST. ALOYSIUS' COLLEGE JABALPUR (MADHYA PRADESH)

Autonomous, Reaccredited 'A++' Grade by NAAC (CGPA 3.58/4.00)

College with Potential for Excellence (CPE) by UGC

DST-FIST Supported & Star College Scheme by DBT

Affiliated to Rani Durgavati Vishwavidyalaya, Jabalpur (M.P.)

B.Sc. CS II Semester

Paper-Minor Introduction to Programming Methodologies

No. of Lectures (in hours per week): 3 Hrs. per week

Total No. of Lectures: 45 Hrs.

Maximum Marks: 70

Units	Topics	No. of Lectures
I	<p>Relevant Indian Knowledge System (IKS) Inclusions: Algorithmic Thinking in Ancient India: How Panini Ashtadhyayi influenced formal grammar in modern programming, how the Vedic data structuring methods inspired hierarchical structures in computer science.</p> <p>Introduction to Programming: Program Concept, Characteristics of Programming, Stages in Program Development, Algorithms, Notations, Design, Flowcharts, Types of Programming Methodologies. Introduction to C++ Programming - Basic Program Structure in C++, Data Types, Variables, Constants, Operators and Basic I/O.</p> <p>Suggested Activities for Experiential Learning:</p> <ol style="list-style-type: none">1. Comparative study on Panini's grammar and modern programming syntax.2. Develop a simple algorithmic solution inspired by Vedic classifications.	12
II	<p>Variables: Declaring, Defining and Initializing Variables, Scope of Variables, Using Named Constants, Keywords, Casting of Data Types, Operators (Arithmetic, Logical and Bitwise), Using Comments in programs, Character I/O (getc, getchar, putc, putchar etc.), Formatted and Console I/O (printf(), scanf(), cin(), cout()).</p> <p>Using Basic Header Files: (stdio.h, iostream.h, conio.h etc.). Simple Expressions in C++ (including Unary Operator Expressions, Binary Operator Expressions), Understanding Operators Precedence in Expressions.</p> <p>Indian contribution to early computing: Contribution by Dr. Raj Reddy.</p> <p>Suggested Activities for Experiential Learning:</p> <ol style="list-style-type: none">1. Code Debugging Challenge: Assign buggy C++ programs for students to debug and improve.2. Concept Visualization: Use flowcharts and pseudocode tools to map variable types and memory usage.	12
III	<p>Conditional Statements: if construct, switch-case construct.</p> <p>Iterative Statements: while, do-while, and for loops; use of break and continue in loops; using nested statements (conditional as well as iterative).</p> <p>Functions: Top-Down Design, Pre-defined Functions, Programmer-defined Functions, Local Variables and Global Variables, Functions with Default Arguments, Call-By-Value and Call-By-Reference, Parameters.</p> <p>Introduction to Arrays: Declaration and Referring Arrays, Arrays in Memory, Initializing Arrays, Arrays in Functions.</p> <p>Recursion in the context of ancient Indian texts (e.g., Chandas Shastra).</p> <p>Suggested Activities for Experiential Learning:</p> <ol style="list-style-type: none">1. Conditional Logic Game: Design a decision-based game using if-else and switch-case.2. Function Optimization Task: Analyze and optimize recursive vs. iterative function performance.	12



ST. ALOYSIUS' COLLEGE JABALPUR (MADHYA PRADESH)

Autonomous, Reaccredited 'A++' Grade by NAAC (CGPA 3.58/4.00)

College with Potential for Excellence (CPE) by UGC

DST-FIST Supported & Star College Scheme by DBT

Affiliated to Rani Durgavati Vishwavidyalaya, Jabalpur (M.P.)

IV	<p>Structures: Structures: Member Accessing, Structures and Functions.</p> <p>Strings: Reading and Writing Strings, Arrays of Strings, String and Function.</p> <p>Searching algorithms: Linear Search, Binary Search</p> <p>Linked List Concept in Indian Knowledge: Sanskrit texts followed a linked hierarchical structuring for oral transmission, similar to linked lists.</p> <p>Suggested Activities for Experiential Learning:</p> <ol style="list-style-type: none">1. Linked List Research Assignment: Compare linked list pointer-based structure with ancient manuscript referencing.2. Chart Preparation: Prepare charts Linked List, Array & Stack.	07
V	<p>Indian Contribution to the field: Indian Contribution to the field: Innovations in India, origin of Julia Programming Language, Indian Engineers who designed new programming languages, open-source languages.</p> <p>Dr. Sartaj Sahni — Computer Scientist - Pioneer of data structures, Murthy's Early Work in Software Development.</p> <p>Other relevant contributors and contributions.</p> <p>Suggested Activities for Experiential Learning:</p> <ol style="list-style-type: none">1. Search Algorithm Hackathon: Implement linear, binary, and hashing techniques to solve real-world problems.	02

References

Text Books:

- Lipschutz: Schaum's Outline Series Data Structures, Tata McGraw-Hill.
- Problem Solving and Program Design in C, J. R. Hanly and E. B. Koffman, Pearson, 2015.
- E. Balaguruswamy, 'C++', TMH Publication ISBN 0-07-462038-X.
- Herbert Schildt, 'C++ The Complete Reference', TMH Publication ISBN 0-07-463880-7.
- R. Lafore, 'Object Oriented Programming C++'.
- N. Dale and C. Weems, Programming and Problem Solving with C++: Brief Edition, Jones & Bartlett Learning.
- Staal, F. (2006). The Science of Language and Logic in India.
- Joseph, G. G. (1991). The Crest of the Peacock: Non-European Roots of Mathematics.
- Bhaskara II (12th Century). Lilavati and Bijaganita.
- Pingree, D. (1978). Mathematical Astronomy in India.
- Kosambi, D. D. (1948). The Culture and Civilization of Ancient India.
- Sahni, S. (2005). Data Structures, Algorithms, and Applications in C++.

Suggested Digital Platform Web Links:

- http://www.ndl.gov.in/he_document/ekumbh/97
- http://www.ndl.gov.in/he_document/nptel/IN_N_1_CSA_E_9093_NPDS_Aaup_12265_12266
- <https://archive.nptel.ac.in/courses/106/101/106101208/>
- <https://archive.nptel.ac.in/courses/106/106/106106133/>
- <https://epgp.inflibnet.ac.in/Home/ViewSubject?catid=fBYcKOKlvP3a/8Vd3L08tQ==>
- <https://nptel.ac.in/courses/106105151>
- <https://archive.nptel.ac.in/courses/106/106/106106145/>



ST. ALOYSIUS' COLLEGE JABALPUR (MADHYA PRADESH)

Autonomous, Reaccredited 'A++' Grade by NAAC (CGPA 3.58/4.00)

College with Potential for Excellence (CPE) by UGC

DST-FIST Supported & Star College Scheme by DBT

Affiliated to Rani Durgavati Vishwavidyalaya, Jabalpur (M.P.)

B.Sc. CS II Semester

Paper-Minor Introduction to Programming Methodologies

1. To learn elementary techniques involving arithmetic operators and mathematical expressions, appropriate use of selection (if, switch, conditional operators) and control structures.
2. Write a program to swap the contents of two variables.
3. Write a program to find area of a circle, rectangle, square using switch case.
4. Write a program to check whether a given number is even or odd.
5. Write a program to print table of any number.
6. Write a program to print Fibonacci series.
7. Write a program to find factorial of a given number.
8. Write a program to check given string is palindrome or not.
9. Write a program to print digits of entered number in reverse order.
10. Write a program to generate even/odd series from 1 to 100.
11. Write a program whether a given number is prime or not.
12. Write a program to check entered number is Armstrong or not.
13. Write a program for an array.
14. Write a program to input N numbers, add them and find average.
15. Write a program to demonstrate the use of for, while and do-while loop.



ST. ALOYSIUS' COLLEGE JABALPUR (MADHYA PRADESH)

Autonomous, Reaccredited 'A++' Grade by NAAC (CGPA 3.58/4.00)

College with Potential for Excellence (CPE) by UGC

DST-FIST Supported & Star College Scheme by DBT

Affiliated to Rani Durgavati Vishwavidyalaya, Jabalpur (M.P.)

Faculty of Science

Bachelor of Science (B.Sc.), III Semester

SUBJECT: COMPUTER SCIENCE

Paper-Major/Minor

Computer Networks & Information Security

Course Outcomes

CO. No.	Course Outcomes	Cognitive Level
CO 1	Understand the uses and types of computer networks, including broadband, mobile, wireless, and enterprise networks.	U, R
CO 2	Learn about PAN, LAN, MAN, and WAN technologies.	U, R, An
CO 3	Gain knowledge of OSI and TCP/IP models, data link layer protocols, and switching techniques.	U, R, An
CO4	Master routing algorithms, IP addressing, and congestion management.	U, An, Ap
CO5	Understand security principles, types of attacks, and security technologies like firewalls and cryptographic tools.	An, AP, R, U

Credit and Marking Scheme

	Credits	Marks		Total Marks
		Internal	External	
Theory	4	40	60	100
Practical	2	40	60	100
Total	6	200		

Evaluation Scheme

	Marks	
	Internal	External
Theory	3 Internal Exams of 20 Marks (During the Semester) (Best 2 will be taken)	1 External Exams (At the End of the Semester)
Practical	3 Internal Exams (During the Semester) (Best 2 will be taken)	1 External Exams (At the End of the Semester)



ST. ALOYSIUS' COLLEGE JABALPUR (MADHYA PRADESH)

Autonomous, Reaccredited 'A++' Grade by NAAC (CGPA 3.58/4.00)

College with Potential for Excellence (CPE) by UGC

DST-FIST Supported & Star College Scheme by DBT

Affiliated to Rani Durgavati Vishwavidyalaya, Jabalpur (M.P.)

**Bachelor of Science (B.Sc.)
III Semester**

**Subject: Computer Science
Paper: Major/Minor, Computer Networks & Information Security**

Content of the Course

No. of Lectures (in hours per week): 2 Hrs. per week

Total No. of Lectures: 60 Hrs.

Maximum Marks: 60

Units	Topics	No. of Lectures
I	Introduction to Computer Network: Use of Computer network: Access to information, person-to-person communication electronic commerce, internet of things. Types of computer networks: Broadband access network, Mobile and wireless network, content delivery network, transit network, Enterprise network. Network Technology: Personal Area Network Local Area Network, Metropolitan Area Network, Wide Area Network, example of network (Internet, Mobile network, wireless network); Reference Model: OSI, TCP/IP, Critique of the OSI and TCP/IP reference models.	10
II	Physical Layer: Guided Transmission Media: Twisted pairs, coaxial cable, Fiber Optics; Wireless transmission: The electromagnetic spectrum, frequency hopping spread spectrum, direct sequence, spread spectrum, ultra deb communication; Cellular Network: Common concepts-cells, handoff, 1G 2G,3G,4G & 5G technology.	10
III	Data Link Layer: Service Provided to Network Layer: Data Link Control: Framing, Flow and Error Control; Error detecting codes, Error-correcting codes; Data Link Protocols: Basic transmission and receipt, simplex, full duplex, sliding window protocol, Point-to-Point Protocol. Switching Techniques: Packet Switching, Circuit Switching, Datagram Networks, VirtualCircuit Networks. Network Devices & Drivers: Router, Modem, Repeater, Hub, Switch, Bridge and Gateway (fundamental concepts)	10
IV	Network Layer: Routing Algorithm: Optimality, Principal of Shortest path algorithm, Flooding, Distance Vector Routing, Broadcast Routing; Congestion in network, traffic management approaches; IP addresses, IPv4 Addresses, IP v6 Addresses. Virtual Circuit Networks: Frame relay and ATM, Transport Layer: Process- Process Delivery; UDP, TCP. Application Layers: DNS, SMTP, POP, FTP, http and https. Basics of Wi-Fi (Fundamental concepts Only).	15
V	Network Security and Information Security: Fundamentals of network and information security: principles of security and attack. Security Goals (Confidentiality, Integrity, and Availability). Overview of Security Threats and Vulnerability: Types of attacks on Confidentiality, Integrity and Availability. Vulnerability and Threats: Phishing Attacks, E-mail threats, web threats, Intruders and Hackers, Insider threats, SQL injection Attacks, Ransomware. Malware: Worms, Virus Spams, Adware, Spyware, Trojans. Security Technology: Firewalls, intruding detection and prevention systems, Scanning and Analysis Tools: Biometric access controls, Cipher methods, cryptographic algorithms, cryptographic tools.	15

References

Textbooks:

- Andrew S. J. Wetherall, Computer Networks, 6th Edition, (2021), Pearson.
- J Mattord, Principles of Information Security, Fourth Edition, 6th Indian Reprint.
- Praveen Kinnar Shur la, Surya Prakash Tripathi, Ritendra Goe 1 "Introduction to Information Security and Cyber Laws", 2014. Dreamtech Press.
- Books published by Hindi Granth Academy, Bhopal.

Reference Books:

- Kurose James F., Ross Keith W., Computer Networking, A 4 op-Down Approach, Sixth Edition, 2017.



ST. ALOYSIUS' COLLEGE JABALPUR (MADHYA PRADESH)

Autonomous, Reaccredited 'A++' Grade by NAAC (CGPA 3.58/4.00)

College with Potential for Excellence (CPE) by UGC

DST-FIST Supported & Star College Scheme by DBT

Affiliated to Rani Durgavati Vishwavidyalaya, Jabalpur (M.P.)

Pearson

- Micki Krausc. Harold F. Tipton, Handbook of Information Security Management, Vol. 1-3, CRC Press LLC.
- B. A. Forouzan: Data Communications and Networking. Fourth edition, TMH Publishing Company Ltd.
- Basta W. Halton, Computer Security: Concepts, Issues and Implementation, Cengage Learning India.

List of Practical

- Study of UTP cable
 - Color code of UTP cable Categories of UTP n/w cable
 - Shielding of n/w cable
 - Maximum length for which data cable can be usedCrimping of RJ45 connector and punching of datacab1e
- Knowledge of Structured Cabling and its componentsInformation Information outlet with box
 - Network Rack (4U, 6U, 9U, 12U, 24U, 32U, 42U)
 - Patch Panel
 - Rack Management
- Study of Optical Fiber cable
 - Different cores of OF C (6 core, 12, 24 core) Multimode & Single mode OFC cable Shielding ofOFC
 - Splicing/Termination of OFC. OTDR Testing
 - LIU fix
 - LIU management (pigtail/fiber patchcord) and MediaConverter.
 - FP module.
 - Rules of OFC laying
- Use of tools
 - Crimping tool
 - Punching tool
 - Nose plier
 - Wire stripping and cable cutter
 - Multi-meter
- Configuration/management of Local Area Network
 - Implementation of File and printer sharing Installationof ft server and client
 - Connect the computers to Local Area Network.
 - Configuring Class, A IP address on LAN Connection inComputer LAB and use the following tools:
 - Ping, ipconfig, getmac, hostname, nslookup,tracert, systeminfo.
 - routing using packet tracer software
 - Dynamic routing using packet tracer
 - Implementation of Subnetting in Class A, B, C
 - Ping between 2 s2'stems using IPv6





ST. ALOYSIUS' COLLEGE JABALPUR (MADHYA PRADESH)

Autonomous, Reaccredited 'A++' Grade by NAAC (CGPA 3.58/4.00)

College with Potential for Excellence (CPE) by UGC

DST-FIST Supported & Star College Scheme by DBT

Affiliated to Rani Durgavati Vishwavidyalaya, Jabalpur (M.P.)

Faculty of Science

Bachelor of Science (B.Sc.), III Semester

SUBJECT: COMPUTER SCIENCE

Paper-Elective

Computer Networks & Information Security

Course Outcomes

CO. No.	Course Outcomes	Cognitive Level
CO 1	Understand the uses and types of computer networks, including broadband, mobile, wireless, and enterprise networks.	U, R
CO 2	Learn about PAN, LAN, MAN, and WAN technologies.	U, R, An
CO 3	Gain knowledge of OSI and TCP/IP models, data link layer protocols, and switching techniques.	U, R, An
CO4	Master routing algorithms, IP addressing, and congestion management.	U, An, Ap
CO5	Understand security principles, types of attacks, and security technologies like firewalls and cryptographic tools.	An, AP, R, U

Credit and Marking Scheme

	Credits	Marks		Total Marks
		Internal	External	
Theory	3	40	60	100
Practical	1	40	60	100
Total	4	200		

Evaluation Scheme

	Marks	
	Internal	External
Theory	3 Internal Exams of 20 Marks (During the Semester) (Best 2 will be taken)	1 External Exams (At the End of the Semester)
Practical	3 Internal Exams (During the Semester) (Best 2 will be taken)	1 External Exams (At the End of the Semester)





ST. ALOYSIUS' COLLEGE JABALPUR (MADHYA PRADESH)

Autonomous, Reaccredited 'A++' Grade by NAAC (CGPA 3.58/4.00)

College with Potential for Excellence (CPE) by UGC

DST-FIST Supported & Star College Scheme by DBT

Affiliated to Rani Durgavati Vishwavidyalaya, Jabalpur (M.P.)

**Bachelor of Science (B.Sc.)
III Semester**

**Subject: Computer Science
Paper: Elective, Computer Networks & Information Security**

Content of the Course

No. of Lectures (in hours per week): 2 Hrs. per week

Total No. of Lectures: 60 Hrs.

Maximum Marks: 60

Units	Topics	No. of Lectures
I	Introduction to Computer Network: Use of Computer network: Access to information, person-to-person communication electronic commerce, internet of things. Types of computer networks: Broadband access network, Mobile and wireless network, content delivery network, transit network, Enterprise network. Network Technology: Personal Area Network Local Area Network, Metropolitan Area Network, Wide Area Network, example of network (Internet, Mobile network, wireless network); Reference Model: OSI, TCP/IP, Critique of the OSI and TCP/IP reference models.	10
II	Physical Layer: Guided Transmission Media: Twisted pairs, coaxial cable, Fiber Optics; Wireless transmission: The electromagnetic spectrum, frequency hopping spread spectrum, direct sequence, spread spectrum, ultra deb communication; Cellular Network: Common concepts-cells, handoff, 1G 2G,3G,4G & 5G technology.	10
III	Data Link Layer: Service Provided to Network Layer: Data Link Control: Framing, Flow and Error Control; Error detecting codes, Error-correcting codes; Data Link Protocols: Basic transmission and receipt, simplex, full duplex, sliding window protocol, Point-to-Point Protocol. Switching Techniques: Packet Switching, Circuit Switching, Datagram Networks, VirtualCircuit Networks. Network Devices & Drivers: Router, Modem, Repeater, Hub, Switch, Bridge and Gateway (fundamental concepts)	10
IV	Network Security and Information Security: Fundamentals of network and information security: principles of security and attack. Security Goals (Confidentiality, Integrity, and Availability). Overview of Security Threats and Vulnerability: Types of attacks on Confidentiality, Integrity and Availability. Vulnerability and Threats: Phishing Attacks, E-mail threats, web threats, Intruders and Hackers, Insider threats, SQL injection Attacks, Ransomware. Malware: Worms, Virus Spams, Adware, Spyware, Trojans.	15

References

Textbooks:

- Andrew S. J. Wetherall, Computer Networks, 6th Edition, (2021), Pearson.
- J Mattord, Principles of Information Security, Fourth Edition, 6th Indian Reprint.
- Praveen Kinnar Shur la, Surya Prakash Tripathi, Ritendra Goe 1 "Introduction to Information Security and Cyber Laws", 2014. Dreamtech Press.
- Books published by Hindi Granth Academy, Bhopal.

Reference Books:

- Kurose James F., Ross Keith W., Computer Networking, A 4 op-Down Approach, Sixth Edition, 2017. Pearson
- Micki Krausc. Harold F. Tipton, Handbook of Information Security Management, Vol. 1-3, CRC Press LLC.
- B. A. Forouzan: Data Communications and Networking. Fourth edition, TMH Publishing Company Ltd.
- Basta W. Halton, Computer Security: Concepts, Issues and Implementation, Cengage Learning India.

List of Practical

- Study of UTP cable
 - Color code of UTP cable Categories of UTP n/w cable
 - Shielding of n/w cable



ST. ALOYSIUS' COLLEGE JABALPUR (MADHYA PRADESH)

Autonomous, Reaccredited 'A++' Grade by NAAC (CGPA 3.58/4.00)

College with Potential for Excellence (CPE) by UGC

DST-FIST Supported & Star College Scheme by DBT

Affiliated to Rani Durgavati Vishwavidyalaya, Jabalpur (M.P.)

- Maximum length for which data cable can be usedCrimping of RJ45 connector and punching of datacab1e
- Knowledge of Structured Cabling and its componentsInformation Information outlet with box
 - Network Rack (4U, 6U, 9U, 12U, 24U, 32U, 42U)
 - Patch Panel
 - Rack Management
- Study of Optical Fiber cable
 - Different cores of OF C (6 core, 12, 24 core) Multimode & Single mode OFC cable Shielding ofOFC
 - Splicing/Termination of OFC. OTDR Testing
 - LIU fix
 - LIU management (pigtail/fiber patchcord) and MediaConverter.
 - FP module.
 - Rules of OFC laying
- Use of tools
 - Crimping tool
 - Punching tool
 - Nose plier
 - Wire stripping and cable cutter
 - Multi-meter
- Configuration/management of Local Area Network
 - Implementation of File and printer sharing Installationof ft server and client
 - Connect the computers to Local Area Network.
 - Configuring Class, A IP address on LAN Connection inComputer LAB and use the following tools:
 - Ping, ipconfig, getmac, hostname, nslookup,tracert, systeminfo.
 - routing using packet tracer software
 - Dynamic routing using packet tracer
 - Implementation of Subnetting in Class A, B, C
 - Ping between 2 s2'stems using IPv6



ST. ALOYSIUS' COLLEGE JABALPUR (MADHYA PRADESH)

Autonomous, Reaccredited 'A++' Grade by NAAC (CGPA 3.58/4.00)

College with Potential for Excellence (CPE) by UGC

DST-FIST Supported & Star College Scheme by DBT

Affiliated to Rani Durgavati Vishwavidyalaya, Jabalpur (M.P.)

Faculty of Science

Bachelor of Science (B.Sc.), III Semester

SUBJECT: COMPUTER SCIENCE

Paper-Elective

Computer Networks & Information Security

Course Outcomes

CO. No.	Course Outcomes	Cognitive Level
CO 1	Define and describe the components of a data communication system such as various protocols. OSI Model, data transmission in analog and digital format	U, A
CO 2	Identify and differentiate among the network devices and drives	K, An, Ap
CO 3	Learn and describe various error detection and correction methods. describe the Various terminologies used in the Network and Application layers.	U, Ap

Credit and Marking Scheme

	Credits	Marks		Total Marks
		Internal	External	
Theory	3	40	60	100
Practical	1	40	60	100
Total	4	200		

Evaluation Scheme

	Marks	
	Internal	External
Theory	3 Internal Exams of 20 Marks (During the Semester) (Best 2 will be taken)	1 External Exams (At the End of the Semester)
Practical	3 Internal Exams (During the Semester) (Best 2 will be taken)	1 External Exams (At the End of the Semester)





ST. ALOYSIUS' COLLEGE JABALPUR (MADHYA PRADESH)

Autonomous, Reaccredited 'A++' Grade by NAAC (CGPA 3.58/4.00)

College with Potential for Excellence (CPE) by UGC

DST-FIST Supported & Star College Scheme by DBT

Affiliated to Rani Durgavati Vishwavidyalaya, Jabalpur (M.P.)

Content of the Course

Theory

No. of Lectures (in hours per week): 2 Hrs. per week

Total No. of Lectures: 60 Hrs.

Maximum Marks: 60

Units	Topics	No. of Lectures
I	Introduction to Computer Network: Use of Computer network: Access to information, person-to-person communication electronic commerce, internet of things. Types of computer networks: Broadband access network, Mobile and wireless network, content delivery network, transit network, Enterprise network. Network Technology: Personal Area Network, Local Area Network, Metropolitan Area Network, Wide Area Network, example of network (Internet, Mobile network, wireless network); Reference Model: OSI, TCP/IP, Critique of the OSI and TCP/IP reference models.	10
II	Physical Layer: Guided Transmission Media: Twisted pairs, coaxial cable, Fiber Optics; Wireless transmission: The electromagnetic spectrum, frequency hopping spread spectrum, direct sequence, spread spectrum, ultra-deb communication; Cellular Network: Common concepts- cells, handoff, 1G 2G,3G,4G & 5G technology.	10
III	Data Link Layer: Service Provided to Network Layer: Data Link Control: Framing, Flow and Error Control; Error detecting codes, Error-correcting codes; Data Link Protocols: Basic transmission and receipt, simplex link layer protocol, full duplex, sliding window protocol, Packet over SONET, ADSL, Point-to-Point Protocol. Switching Techniques: Packet Switching, Circuit Switching, Datagram Networks, VirtualCircuit Networks, and Structure of a Switch. Network Devices & Drivers: Router, Modem, Repeater, Hub, Switch, Bridge and Gateway (fundamental concepts)	10
IV	Network Layer: Routing Algorithm: Optimality, Principle of Shortest Path Algorithm, Flooding, Distance Vector Routing, Broadcast Routing; Congestion in network, traffic management approaches; IP addresses, IPv4 Addresses, IPv6 Addresses. Network Security and Information Security: Fundamentals of network and information security: principles of security and attack. Security Goals (Confidentiality, Integrity, and Availability). Overview of Security Threats and Vulnerability: Types of attacks on Confidentiality, Integrity and Availability.	15



ST. ALOYSIUS' COLLEGE JABALPUR (MADHYA PRADESH)

Autonomous, Reaccredited 'A++' Grade by NAAC (CGPA 3.58/4.00)

College with Potential for Excellence (CPE) by UGC

DST-FIST Supported & Star College Scheme by DBT

Affiliated to Rani Durgavati Vishwavidyalaya, Jabalpur (M.P.)

References

Textbooks:

- Andrew S. J. Wetherall, Computer Networks, 6th Edition,(2021), Pearson.
- J Mattord, Principles of Information Security, Fourth Edition, 6 th Indian Reprint.
- Praveen Kinnar Shur la, Surya Prakash Tripathi, Ritendra Goe 1 “Introduction to Information Security an Cyber Laws”, 2014. Dreamtech Press.
- Books published by Hindi Granth Academy, Bhopal

Reference Books:

- Kurose James F., Ross Keith W., Computer Networking, A 4 op-Down Approach, Sixth Edition, 2017. Pearson
- Micki Krausc. Harold F. Tipton, Handbook of Information Security Management, Vol. 1-3, CRC Press LLC.
- B. A. Forouzan: Data Communications and Networking. Fourth edition, TMH Publishing Company Ltd.
- Basta W. Halton, Computer Security: Concepts, Issues and Implementation, Cengage Learning India.



ST. ALOYSIUS' COLLEGE JABALPUR (MADHYA PRADESH)

Autonomous, Reaccredited 'A++' Grade by NAAC (CGPA 3.58/4.00)

College with Potential for Excellence (CPE) by UGC

DST-FIST Supported & Star College Scheme by DBT

Affiliated to Rani Durgavati Vishwavidyalaya, Jabalpur (M.P.)

ST. ALOYSIUS' COLLEGE(AUTONOMOUS) JABALPUR

PART A: Introduction

Program: Diploma	Session: 2025-2026	Class: B.Sc.	Semester: IV
Subject: Computer Science (B.Sc.)			
1. Course Code		S2-COSC2T	
2. Course Title		Object Oriented Programming with Java	
3. Course Type		Major/ Minor	
4. Pre-Requisite (if any)		To study this course, a student must have successfully completed the course on Programming Methodology at Certificate Level.	
5. Course learning outcome	<ul style="list-style-type: none"> • Implement Object Oriented programming concept using basic syntaxes of controlStructures, strings and functions for developing skills of logic building activity. • Identify classes, objects, members of a class and the relationships among themneeded for finding the solution to a specific problem. • Demonstrates how to achieve re-usability using inheritance, interfaces and packagesand describes faster application development can be achieved. • Demonstrate, understanding and use of different exception-handling mechanismsand concepts of multi-threading for robust faster and efficient application development. • Identify and describe a common abstract user interface. components to design GUIin Java using Applet & Graphics. • Identify, Design & Develop complex Graphical user interfaces using AWT. 		
6. Credit Value	Theory—4 Credits		
7. Total Marks	Max. Marks: 40+60	Min. Passing Marks: 35	



ST. ALOYSIUS' COLLEGE JABALPUR (MADHYA PRADESH)

Autonomous, Reaccredited 'A++' Grade by NAAC (CGPA 3.58/4.00)

College with Potential for Excellence (CPE) by UGC

DST-FIST Supported & Star College Scheme by DBT

Affiliated to Rani Durgavati Vishwavidyalaya, Jabalpur (M.P.)

PART B: Content of the Course

Lectures (in hours per week): 2 Hrs. per week

Total No. of Lectures (in hours): 60 Hrs.

Module	Topics	No. of Lectures
I	The Java Environment: History and features of java, C++ VS java, JAVA Program Structure, Java Virtual Machine concepts, Primitive data types, variables and constants, operators, expression, statement-branching, looping and jumping, labeled statements.	14
II	Object Oriented Programming in Java: Classes, objects and methods: defining a class, adding variables and methods, creating objects, constructor, Instances, field and methods initialization by constructors, Copy constructor. Arrays, String classes, Wrapper classes.	14
III	Inheritance: Inheritance basics, Super class, Sub-class, Method overloading, abstract classes. Interfaces: defining an interface, implementing & applying interfaces, variables in interfaces, extending interfaces.	14
IV	Multithreading and Exception Handling: Basic idea of multithreaded programming; The lifecycle of a thread, Creating thread with the thread class and runnable interface, Basic idea of exception handling: The try, catch and finally.	14
V	AWT: Introduction, AWT Components: Label, Button, TextField, Checkbox, CheckboxGroup, Choice, List, Scrollbar, MenuItem & Menu, Panel. Layout Managers: FlowLayout, BorderLayout, CardLayout, GridLayout. Event Handling: ActionListener, MouseListener and ItemListener Interface.	14

PART C: Learning Resources

Textbooks, Reference Books, Other Resources

Suggested Readings

Text Books

- E Balguruswami, Programming with Java, Tata McGrnw-Hill Publication.

Reference Books

- Bruce Eckel, Thinking in Java.
- Herbert Schildt Java: The Complete Reference.
- Y. Daniel Liang, Introduction to Java Programming.
- Paul Deitel, Harvey Deitel, Java: How To Program.
- Cay S. Horstmann, Core Java Volume I - Fundamentals .
- Java Projects, BPB Publication.
- Dr. S.S. Kandare, Programming in Java, S Chand Publication.
- Books published by M.P. Hindi Granth Academy, Bhopal



ST. ALOYSIUS' COLLEGE JABALPUR (MADHYA PRADESH)

Autonomous, Reaccredited 'A++' Grade by NAAC (CGPA 3.58/4.00)

College with Potential for Excellence (CPE) by UGC

DST-FIST Supported & Star College Scheme by DBT

Affiliated to Rani Durgavati Vishwavidyalaya, Jabalpur (M.P.)

Suggestive digital platform web links

- <https://www.cs.cmu.edu/afs/cs.cmu.edu/usei/gclien/www/download/java/LeainJava.pdf>
- https://www.tutorialspoint.confjava/java_tutorial.pdf
- <https://www.youtube.com/watch=7soxDfdgtDw>
- http://www.mphindigranthaca_gemy.org/
- Suggested equivalent on line courses : <https://nptel.ac.in/courses/106/105/106105191/>

Part D-Assessment and Evaluation

Suggested Continuous Evaluation Methods: Maximum Marks: 100

Continuous Comprehensive Evaluation (CCE): 40 marks University Exam (UE) 60 marks

Internal Assessment Continuous Comprehensive Evaluation (CCE)	Class Test/Assignment/Presentation and Other	Total 40
External Assessment University Exam Section	Section (A) : Objective Questions Section (B): Short Questions Section (C): Long Questions	Total 60



ST. ALOYSIUS' COLLEGE JABALPUR (MADHYA PRADESH)

Autonomous, Reaccredited 'A++' Grade by NAAC (CGPA 3.58/4.00)

College with Potential for Excellence (CPE) by UGC

DST-FIST Supported & Star College Scheme by DBT

Affiliated to Rani Durgavati Vishwavidyalaya, Jabalpur (M.P.)

ST. ALOYSIUS' COLLEGE(AUTONOMOUS) JABALPUR			
PART A: Introduction			
Program: Diploma	Session: 2025-26	Class: B.Sc.	Semester: IV
Subject: Computer Science (B.Sc.)			
8. Course Code		S2-COSC2P	
9. Course Title		Object Oriented Programming with Java	
10. Course Type		LAB	
11. Pre-Requisite (if any)		To study this course, a student must have successfully completed the course on Programming Methodology at Certificate Level.	
12. Course learning outcome	After the completion of this course, will be able to do the following: <ul style="list-style-type: none"> • Implement Object Oriented programming concept using basic syntaxes of control Structures, strings and functions for developing skills of logical building activity. • Identify classes, objects, members of a class and the relationships among them needed for finding the solution to a specific problem. • Demonstrates how to achieve reusability using inheritance, interfaces and packages and describes faster application development can be achieved. • Demonstrate, understanding and use of different exception-handling mechanisms and concepts of multi-threading for robust faster and efficient application development. • Identify and describe common abstract user interface components to design GUI in Java using Applet & AWT along with a response to events. • Identify, Design & Develop complex Graphical user Interfaces using principal Java. 		
13. Credit Value			Practical— 2 Credits
14. Total Marks	Max. Marks: 100	Min. Passing Marks: 35	
PART B: Content of the Course			
Lectures (in hours per week): 1 Hrs. per week			
Total No. of Lectures (in hours): 30 Hrs.			
Module	Topics		No. of Labs.



ST. ALOYSIUS' COLLEGE JABALPUR (MADHYA PRADESH)

Autonomous, Reaccredited 'A++' Grade by NAAC (CGPA 3.58/4.00)

College with Potential for Excellence (CPE) by UGC

DST-FIST Supported & Star College Scheme by DBT

Affiliated to Rani Durgavati Vishwavidyalaya, Jabalpur (M.P.)

	<p>(Using any Text editor: Notepad/Eclipse/Netbeans/ Sublime etc.)</p> <ol style="list-style-type: none">1. Write a program to print number in words using Nested if and Switch case.2. WAP called Odd Even which prints “odd number” if the int variable “number” is odd or “even number” otherwise.3. WAP to find sum and average of 10 number using array.4. WAP to display reverse of a number digit using arrays.5. WAP to display grade according to the marks obtained by the student.6. Find the factorial of a given number.7. WAP to print Fibonacci series.8. WAP to implement method overloading.9. WAP to design a class using abstract method and classes.10. WAP to implement parameterized constructor with default argument.11. WAP to implement multiple inheritance.12. Add two numbers using actionlistener.13. Design a registration form using awt controls and gridlayout.14. Design menus and menuitems.15. Display Coordinate at a click position using mousetlistener.	20
--	--	----



ST. ALOYSIUS' COLLEGE JABALPUR (MADHYA PRADESH)

Autonomous, Reaccredited 'A++' Grade by NAAC (CGPA 3.58/4.00)

College with Potential for Excellence (CPE) by UGC

DST-FIST Supported & Star College Scheme by DBT

Affiliated to Rani Durgavati Vishwavidyalaya, Jabalpur (M.P.)

ST. ALOYSIUS' COLLEGE(AUTONOMOUS) JABALPUR

PART A: Introduction

Program: Diploma	Session: 2025-26	Class: B.Sc.	Semester: IV
Subject: Computer Science (B.Sc.)			
1. Course Code			
2. Course Title		Object Oriented Programming with Java	
3. Course Type		Elective	
4. Pre-Requisite (if any)		To study this course, a student must have successfully completed the course on Programming Methodology at Certificate Level.	
5. Course learning outcome	<ul style="list-style-type: none">• Implement Object Oriented programming concept using basic syntaxes of control structures, strings and functions for developing skills of logic building activity.• Identify classes, objects, members of a class and the relationships among them needed for finding the solution to a specific problem.• Demonstrates how to achieve re-usability using inheritance, interfaces and packages and describes faster application development can be achieved.• Demonstrate, understanding and use of different exception-handling mechanisms and concepts of multi-threading for robust faster and efficient application development.• Identify and describe a common abstract user interface components to design GUI in Java using Applet & Graphics.• Identify, Design & Develop complex Graphical user interfaces using AWT.		
6. Credit Value	Theory—3 Credits		
7. Total Marks	Max. Marks: 40+60		Min. Passing Marks: 35



ST. ALOYSIUS' COLLEGE

JABALPUR (MADHYA PRADESH)

Autonomous, Reaccredited 'A++' Grade by NAAC (CGPA 3.58/4.00)

College with Potential for Excellence (CPE) by UGC

DST-FIST Supported & Star College Scheme by DBT

Affiliated to Rani Durgavati Vishwavidyalaya, Jabalpur (M.P.)

PART B: Content of the Course

Lectures (in hours per week): 2 Hrs. per week

Total No. of Lectures (in hours): 60 Hrs.

Module	Topics	No. of Lectures
I	The Java Environment: History and features of java, C++ VS java, JAVA Program Structure, Java VirtualMachine concepts, Primitive data types, variables and constants, operators, expression, statement-branching, looping and jumping, labeled statements.	14
II	Object Oriented Programming in Java: Classes, objects and methods: defining a class, adding variables and methods, creating objects, constructor, Instances, field and methods initialization by constructors, Copy constructor. Arrays, String classes, Wrapper classes.	14
III	Inheritance: Inheritance basics, Super class, Sub-class, Method overloading, abstract classes. Interfaces: defining an interface, implementing & applying interfaces, variables in interfaces, extending interfaces.	14
IV	Multithreading and Exception Handling: Basic idea of multithreaded programming; The lifecycle of a thread, Creating thread with the thread class and runnable interface, Basic idea of exception handling: The try, catch and finally.	14

PART C: Learning Resources

Textbooks, Reference Books, Other Resources

Suggested Readings

Text Books

- E Balguruswami, Programming with Java, Tata McGrnw-Hill Publication.

Reference Books

- Bruce Eckel, Thinking in Java.
- Herbert Schildt Java: The Complete Reference.
- Y. Daniel Liang, Introduction to Java Programming.
- Paul Deitel, Harvey Deitel, Java: How To Program.
- Cay S. Horstmann, Core Java Volume I - Fundamentals .
- Java Projects, BPB Publication.
- Dr. S.S. Kandare, Programming in Java, S Chand Publication.
- Books published by M.P. Hindi Granth Academy, Bhopal

Suggestive digital platform web links

- <https://www.cs.cmu.edu/afs/cs.cnu.edu/usei/glien/www/download/java/LeainJava.pdf>
- https://www.tutorialspoint.confjava/java_tutorial.pdf
- <https://www.youtube.com/watch=7soxDfdgtDw>
- http://www.mphindigranthaca_gemy.org/



ST. ALOYSIUS' COLLEGE JABALPUR (MADHYA PRADESH)

Autonomous, Reaccredited 'A++' Grade by NAAC (CGPA 3.58/4.00)

College with Potential for Excellence (CPE) by UGC

DST-FIST Supported & Star College Scheme by DBT

Affiliated to Rani Durgavati Vishwavidyalaya, Jabalpur (M.P.)

- Suggested equivalent on line courses : <https://nptel.ac.in/courses/106/105/106105191/>

Part D-Assessment and Evaluation

Suggested Continuous Evaluation Methods: Maximum Marks: 100

Continuous Comprehensive Evaluation (CCE): 40 marks University Exam (UE) 60 marks

Internal Assessment Continuous Comprehensive Evaluation (CCE)	Class Test/Assignment/Presentation and Other	Total 40
External Assessment University Exam Section	Section (A): Objective Questions Section (B): Short Questions Section (C): Long Questions	Total 60



ST. ALOYSIUS' COLLEGE JABALPUR (MADHYA PRADESH)

Autonomous, Reaccredited 'A++' Grade by NAAC (CGPA 3.58/4.00)

College with Potential for Excellence (CPE) by UGC

DST-FIST Supported & Star College Scheme by DBT

Affiliated to Rani Durgavati Vishwavidyalaya, Jabalpur (M.P.)

ST. ALOYSIUS' COLLEGE(AUTONOMOUS) JABALPUR			
PART A: Introduction			
Program: Diploma	Session: 2025-26	Class: B.Sc. IV Semester	Semester: IV
Subject: Computer Science (B.Sc.)			
8. Course Code			
9. Course Title		Object Oriented Programming with Java	
10. Course Type		Elective	
11. Pre-Requisite (if any)		To study this course, a student must have successfully completed the course on Programming Methodology at Certificate Level.	
12. Course learning outcome	<p>After the completion of this course, will be able to do the following:</p> <ul style="list-style-type: none"> • Implement Object Oriented programming concept using basic syntaxes of control Structures, strings and functions for developing skills of logical building activity. • Identify classes, objects, members of a class and the relationships among them needed for finding the solution to a specific problem. • Demonstrates how to achieve reusability using inheritance, interfaces and packages and describes faster application development can be achieved. • Demonstrate, understanding and use of different exception-handling mechanisms and concepts of multi-threading for robust faster and efficient application development. • Identify and describe common abstract user interface components to design GUI in Java using Applet & AWT along with a response to events. • Identify, Design & Develop complex Graphical user Interfaces using principal Java. 		
13. Credit Value		Practical— 1 Credits	
14. Total Marks	Max. Marks: 100	Min. Passing Marks: 35	
PART B: Content of the Course			
Lectures (in hours per week): 1 Hrs. per week			
Total No. of Lectures (in hours): 30 Hrs.			
Module	Topics		No. of Labs.



ST. ALOYSIUS' COLLEGE JABALPUR (MADHYA PRADESH)

Autonomous, Reaccredited 'A++' Grade by NAAC (CGPA 3.58/4.00)

College with Potential for Excellence (CPE) by UGC

DST-FIST Supported & Star College Scheme by DBT

Affiliated to Rani Durgavati Vishwavidyalaya, Jabalpur (M.P.)

	<ul style="list-style-type: none">• (Using any Text editor: Notepad/Eclipse/Netbeans/Sublime etc.) <ol style="list-style-type: none">1. Write a program to print number in words using Nested if and Switch case.2. WAP called Odd Even which prints “odd number” if the int variable “number” is odd or “even number” otherwise.3. WAP to find sum and average of 10 number using array.4. WAP to display reverse of a number digit using arrays.5. WAP to display grade according to the marks obtained by the student.6. Find the factorial of a given number.7. WAP to print Fibonacci series.8. WAP to implement method overloading.9. WAP to design a class using abstract method and classes.10. WAP to implement parameterized constructor with default argument.11. WAP to implement multiple inheritance.	20
--	---	----



ST. ALOYSIUS' COLLEGE JABALPUR (MADHYA PRADESH)

Autonomous, Reaccredited 'A++' Grade by NAAC (CGPA 3.58/4.00)

College with Potential for Excellence (CPE) by UGC

DST-FIST Supported & Star College Scheme by DBT

Affiliated to Rani Durgavati Vishwavidyalaya, Jabalpur (M.P.)

Faculty of Science

Bachelor of Science (B.Sc.) V Semester

SUBJECT: COMPUTER SCIENCE

Paper-Core

Relational Database Management System

CO. No.	Course Outcomes	Cognitive Level
CO 1	Understand database concepts, applications, structure, need for a database and ER-Model terminologies.	U, A
CO 2	Be able to understand the fundamentals of Relational Algebra and relational calculus	K, U
CO 3	To gain skills in creating a logical design of databases, including the E R method and normalization approach.	U
CO 4	Know about SQL functions and operators	U, A
CO 5	Understand the knowledge of Database and transaction management.	U

Credit and Marking Scheme

	Credits	Marks		Total Marks
		Internal	External	
Theory	4	40	60	100
Practical	2	40	60	100
Total	6		200	

Evaluation Scheme

	Marks	
	Internal	External
Theory	3 Internal Exams of 20 Marks (During the Semester) (Best 2 will be taken)	1 External Exams (At the End of the Semester)
Practical	3 Internal Exams (During the Semester) (Best 2 will be taken)	1 External Exams (At the End of the Semester)





ST. ALOYSIUS' COLLEGE JABALPUR (MADHYA PRADESH)

Autonomous, Reaccredited 'A++' Grade by NAAC (CGPA 3.58/4.00)

College with Potential for Excellence (CPE) by UGC

DST-FIST Supported & Star College Scheme by DBT

Affiliated to Rani Durgavati Vishwavidyalaya, Jabalpur (M.P.)

Bachelor of Science (B.Sc.)

Science

Paper: Core, Relational Database Management System

Subject: Computer

V Semester

Content of the Course

No. of Lectures (in hours per week): 2 Hrs. per week

Total No. of Lectures: 60 Hrs.

Maximum Marks: 60

Units	Topics	No. of Lectures
I	Introduction: Advantages of the DBMS approach, various views of data, data independence, schema & sub-schema, Primary concepts of data models, Database languages, transaction management, database administrator, & uses, data dictionary, and overall system architecture. ER Model: Basic concepts, design issues, mapping constraints, keys, ER diagram, weak & strong entity sets, specialization & generalization, aggregation, inheritance, design of ER schema, reduction of ER schema to tables.	12
II	Domain Relation & Keys: Domains, relations, kinds of relation, relational databases, various types of keys, candidate, primary, alternate & foreign keys. Relation algebra & SQL: The structure, relation algebra with extended operations, modification of database, idea of relational calculus, basic structure of SQL, set operation, aggregate function.	12
III	Functional dependencies & Normalization: Base definition, trivial and nontrivial dependencies, closure set of dependencies, & of attributes, irreducible set of dependencies, introduction to normalization, non-loss decomposition, FD diagram, I,II & III NF, dependencies prevention, BCNF, multivalued dependencies, preventions, BCNF, Multivalued dependencies & 4NF, Join dependencies & 5NF.	12
IV	Introduction to SQL, Data types, key constraints:- primary key, Candidate key, Integrity rules Entity integrity, Referential integrity rule. SQL Commands: - DDL, DML, DCL, TCL syntax and examples, select query with all the clauses. Like Predicate, Operator (Between, In, Not in)	12
V	Advanced SQL: - SQL join operations, Sub queries, indexes, sequences, and views SQL Functions. Introduction to PL/SQL:-PL/SQL structure, Cursors, Triggers, Stored Procedures and functions. Transaction Management-concurrency & recovery, ACID properties, transaction state, implementation of atomicity and durability, Storage structure in database - types, hashing.	12

References

Text Books:

- Database concepts by Henry F. Korth, MGH
- An Introduction to Database System by Bipin C. Desai, Galgotia Pub.



ST. ALOYSIUS' COLLEGE JABALPUR (MADHYA PRADESH)

Autonomous, Reaccredited 'A++' Grade by NAAC (CGPA 3.58/4.00)

College with Potential for Excellence (CPE) by UGC

DST-FIST Supported & Star College Scheme by DBT

Affiliated to Rani Durgavati Vishwavidyalaya, Jabalpur (M.P.)

Reference Books:

- Database Management system by Arun K. Majumdar & P. Bhattacharya, TMH Pub.
- Principles of Database System by Jeffrey O. Ullman, Galgotia Pub, Co. Ltd.
- Principles of Database Management System by James Martin, PHI

List of Practical

Sample Table – Worker

WORKER_ID	FIRST_NAME	LAST_NAME	SALARY	JOINING_DATE	DEPARTMENT
-----------	------------	-----------	--------	--------------	------------

Sample Table – Bonus

WORKER_REF_ID	BONUS_DATE	BONUS_AMOUNT
---------------	------------	--------------

Sample Table – Title

WORKER_REF_ID	WORKER_TITLE	AFFECTED_FROM
---------------	--------------	---------------

1. Write an SQL query to fetch "FIRST_NAME" from the Worker table using the alias name as <WORKER_NAME>.
2. Write an SQL query to fetch "FIRST_NAME" from the Worker table in upper case.
3. Write an SQL query to fetch unique values of DEPARTMENT from the Worker table.
4. Write an SQL query to print the first three characters of FIRST_NAME from the Worker table.
5. Write an SQL query to find the position of the alphabet ('a') in the first name column 'Amitabh' from the Worker table.
6. Write an SQL query to print the FIRST_NAME from the Worker table after removing white spaces from the right side.
7. Write an SQL query to print the DEPARTMENT from the Worker table after removing white spaces from the left side.
8. Write an SQL query that fetches the unique values of DEPARTMENT from the Worker table and prints its length.
9. Write an SQL query to print the FIRST_NAME from the Worker table after replacing 'a' with 'A'.
10. Write an SQL query to print the FIRST_NAME and LAST_NAME from the Worker table into a single column COMPLETE_NAME. A space char should separate them.
11. Write an SQL query to print all Worker details from the Worker table order by FIRST_NAME Ascending.
12. Write an SQL query to print all Worker details from the Worker table order by FIRST_NAME Ascending and DEPARTMENT Descending.
13. Write an SQL query to print details for Workers with the first names as "Vipul" and "Satish" from the Worker table.
14. Write an SQL query to print details of Workers with DEPARTMENT name as "Admin".
15. Write an SQL query to print details of the Workers whose FIRST_NAME contains 'a'.
16. Write an SQL query to print details of the Workers whose FIRST_NAME ends with 'a'.
17. Write an SQL query to print details of the Workers whose FIRST_NAME ends with 'h' and contains six alphabets.
18. Write an SQL query to print details of the Workers whose SALARY lies between 100000 and 500000.



ST. ALOYSIUS' COLLEGE JABALPUR (MADHYA PRADESH)

Autonomous, Reaccredited 'A++' Grade by NAAC (CGPA 3.58/4.00)

College with Potential for Excellence (CPE) by UGC

DST-FIST Supported & Star College Scheme by DBT

Affiliated to Rani Durgavati Vishwavidyalaya, Jabalpur (M.P.)

19. Write an SQL query to print details of the Workers who joined in Feb'2014.
Write an SQL query to fetch the count of employees working in the department 'Admin'.
20. Write an SQL query to fetch worker names with salaries ≥ 50000 and ≤ 100000 .
21. Write an SQL query to fetch the no. of workers for each department in descending order.
22. Write an SQL query to print details of the Workers who are also Managers.
23. Write an SQL query to fetch duplicate records having matching data in some fields of a table.
24. Write an SQL query to show only odd rows from a table.
25. Write an SQL query to show only even rows from a table.
26. Write an SQL query to clone a new table from another table.
27. Write an SQL query to fetch intersecting records of two tables.
28. Write an SQL query to show records from one table that another table does not have.



ST. ALOYSIUS' COLLEGE JABALPUR (MADHYA PRADESH)

Autonomous, Reaccredited 'A++' Grade by NAAC (CGPA 3.58/4.00)

College with Potential for Excellence (CPE) by UGC

DST-FIST Supported & Star College Scheme by DBT

Affiliated to Rani Durgavati Vishwavidyalaya, Jabalpur (M.P.)

Faculty of Science

Bachelor of Science (B.Sc.) V Semester

SUBJECT: Computer Science

Paper-DSE I

SOFTWARE ENGINEERING

Course Outcomes

CO. No.	Course Outcomes	Cognitive Level
CO 1	Learn and understand the Concepts of Software Engineering	U
CO 2	Learn and understand the Software Development Life Cycle	U, K, A
CO 3	To Understand and apply the analysis principles to software development.	U, A
CO 4	To apply the design & testing principles to software engineering.	U, A, K

Credit and Marking Scheme

	Credits	Marks		Total Marks
		Internal	External	
Theory	4	40	60	100
Total	4	100		

Evaluation Scheme

	Marks	
	Internal	External
Theory	3 Internal Exams of 20 Marks (During the Semester) (Best 2 will be taken)	1 External Exams (At the End of the Semester)





ST. ALOYSIUS' COLLEGE JABALPUR (MADHYA PRADESH)

Autonomous, Reaccredited 'A++' Grade by NAAC (CGPA 3.58/4.00)

College with Potential for Excellence (CPE) by UGC

DST-FIST Supported & Star College Scheme by DBT

Affiliated to Rani Durgavati Vishwavidyalaya, Jabalpur (M.P.)

Bachelor of Science (B.Sc.)

Science

Paper: DSE-I, Software Engineering System

V Semester

Subject: Computer

No. of Lectures (in hours per week): 3 Hrs. per week

Total No. of Lectures: 60 Hrs.

Maximum Marks: 100

Units	Topics	No. of Lectures
I	Software -What is software? Types of software, Characteristics of Software, Attributes of good software, Software Engineering -What is software engineering? Software engineering costs, what are the key challenges facing software engineering? Systems engineering & Software Engineering.	12
II	Software Development Process Models -What is a software process? What is a software process model? The waterfall model, Evolutionary development, Component-Based Software Engineering (CBSE). Process Iteration -Incremental delivery, Spiral development. Rapid software development -Agile methods, Extreme programming, Rapid application development (RAD), Software prototyping. Computer Aided Software Engineering (CASE) -Overview of CASE approach, Classification of CASE tools.	12
III	Software Requirement Analysis and Specification -System and software requirements, Types of software requirements- Functional and non-functional requirements, Domain requirements, User requirements. Elicitation and analysis of requirements - Overview of techniques, Viewpoints Interviewing, Scenarios, Use-cases, Process modeling with physical and logical DFDs, Entity Relationship Diagram, Data Dictionary, Requirement validation, Requirement specification, Software requirement Specification (SRS), Structure and contents of SRS, SRS format. Software Size Estimation and Cost Estimation -Software Estimation –Size Estimation, Function Point Analysis, LOC Estimation, COCOMO.	12
IV	Software Design -Design Concepts-Abstraction, Architecture, Patterns, Modularity, Cohesion Coupling, Information hiding, Functional independence, Refinement. Design of input and Control, Design of User Interface design- Elements of good design, Design issues. Features of modern GUI - Menus, Scroll bars, windows, Buttons, icons, panels, error Messages, etc.	12
V	Good programming practices and Coding Standards. Software Testing and Quality Assurance -Verification and validation, Techniques of testing-Black-box and White-box testing, Levels of testing -Unit testing, Integration Testing, Interface testing, System testing, Alpha and beta testing, Regression testing. Design of test cases, Quality management activities, Product and process quality, Standards-ISO9000, Capability Maturity Model (CMM).	12

References



ST. ALOYSIUS' COLLEGE JABALPUR (MADHYA PRADESH)

Autonomous, Reaccredited 'A++' Grade by NAAC (CGPA 3.58/4.00)

College with Potential for Excellence (CPE) by UGC

DST-FIST Supported & Star College Scheme by DBT

Affiliated to Rani Durgavati Vishwavidyalaya, Jabalpur (M.P.)

- Software Engineering, A practitioner's Approach- Roger S. Pressman, 6th edition, Mc Graw Hill International Edition.
- An Integrated Approach to Software Engineering by Pankaj Jalote.
- Software Engineering- Sommerville, 7th edition, Pearson Education.
- The unified modeling language user guide Grady Booch, James Rumbaugh, Ivar Jacobson, Pearson Education.

Reference Books:

- Software Engineering, an Engineering approach- James F. Peters, Witold Pedrycz, John Wiley.
- Software Engineering principles and practice- Waman S Jawadekar, The McGraw-Hill Companies.
- Fundamentals of object-oriented design using UML Meiler page-Jones: Pearson Education.

Mrs S. J



ST. ALOYSIUS' COLLEGE JABALPUR (MADHYA PRADESH)

Autonomous, Reaccredited 'A++' Grade by NAAC (CGPA 3.58/4.00)

College with Potential for Excellence (CPE) by UGC

DST-FIST Supported & Star College Scheme by DBT

Affiliated to Rani Durgavati Vishwavidyalaya, Jabalpur (M.P.)

Faculty of Science

Bachelor of Science (B.Sc.), V Semester

SUBJECT: COMPUTER SCIENCE

Paper-Elective (DSE-II)

Operating System

Course Outcomes

CO. No.	Course Outcomes	Cognitive Level
CO 1	Describe the importance of computer system resources and the role of operating systems in their management policies and algorithms.	U, Ap
CO 2	Specify the objectives of modern operating systems and describe how operating systems have evolved over time	K, An
CO 3	Understand various process management concepts and can compare various scheduling techniques, synchronization, and deadlocks.	U
CO 4	Describe the concepts of multithreading and memory management techniques.	U, An
CO 5	Identify the best-suited memory management techniques.	U

Credit and Marking Scheme

	Credits	Marks		Total Marks
		Internal	External	
Theory	3	40	60	100
Practical	1	40	60	100
Total	4	200		

Evaluation Scheme

	Marks	
	Internal	External
Theory	3 Internal Exams of 20 Marks (During the Semester) (Best 2 will be taken)	1 External Exams (At the End of the Semester)
Practical	3 Internal Exams (During the Semester) (Best 2 will be taken)	1 External Exams (At the End of the Semester)



ST. ALOYSIUS' COLLEGE JABALPUR (MADHYA PRADESH)

Autonomous, Reaccredited 'A++' Grade by NAAC (CGPA 3.58/4.00)

College with Potential for Excellence (CPE) by UGC

DST-FIST Supported & Star College Scheme by DBT

Affiliated to Rani Durgavati Vishwavidyalaya, Jabalpur (M.P.)

**Bachelor of Science (B.Sc.)
V Semester
System**

**Subject: Computer Science
Paper: DSE-II, Operating**

Content of the Course

No. of Lectures (in hours per week): 2 Hrs. per week

Total No. of Lectures: 60 Hrs.

Maximum Marks: 60

Units	Topics	No. of Lectures
I	Introduction to Operating System: What is an Operating System? History and Evolution of OS, Basic OS functions, Resource Abstraction, Types of Operating Systems- Multiprogramming Systems, Batch Systems, Time Sharing Systems; Operating Systems for Personal Computers, Workstations and Hand-held Devices, Process Control & Real-time Systems.	12
II	Process Management: Process Concepts, Process States & Process Control Block. Process Scheduling: Scheduling Criteria, Scheduling Algorithms (Preemptive & Non-Preemptive) - FCFS, SJF, SRTN, RR, Priority, Multiple-Processor, Real-Time, Multilevel Queue and Multilevel Feedback Queue Scheduling. Deadlock - Definition, Deadlock Characterization, Necessary and Sufficient Conditions for Deadlock. Deadlock Handling Approaches: Prevention, Avoidance, Detection and Recovery.	12
III	Memory Management: Introduction, Address Binding, Logical versus Physical Address Space, Swapping, Contiguous & Non-Contiguous Allocation, Fragmentation (Internal & External), Compaction, Paging, Segmentation, Virtual Memory, Demand Paging, Performance of Demand Paging, Page Replacement Algorithms. File Management: Concept of File System (File Attributes, Operations, Types), Functions of File System, Types of File System, Access Methods (Sequential, Direct & other methods),	12
IV	Disk Management: Structure, Disk Scheduling Algorithms (FCFS, SSTF, SCAN, C- SCAN, LOOK), LINUX: Introduction, History and features of Linux, advantages, Linux architecture, the File system of LINUX - boot block, super block, inode table, data blocks. Linux standard directories, Linux kernel, Partitioning the hard drive for Linux, system - startup and shut-down process, init and run levels. Process, Swap, Partition, fdisk, checking disk free spaces. CLI OS vs GUI OS, Windows v/s Linux, Files and Directories. Concept of Open-Source Software.	12
V	Linux Administration: Types of user- Root and normal user, Multiple logins simultaneously (Ctrl + Alt + F1, F2,F6), who command. Help: what is, --help, man command Basic Commands: For displaying current directory, files and directories of current/absolute/relative location(s), creating, removing, renaming, copying and moving files or directories. Managing multiple processes: connecting processes with pipes, tee, redirecting input-output, changing process priority with nice, cron commands, kill, ps. Managing user accounts- Sudo, users: useradd, usermod, userdel, passwd. Group: Primary & Secondary Group, chgrp, chown, groupadd, groupdel. Permissions: adding and removing permissions.	12



ST. ALOYSIUS' COLLEGE JABALPUR (MADHYA PRADESH)

Autonomous, Reaccredited 'A++' Grade by NAAC (CGPA 3.58/4.00)

College with Potential for Excellence (CPE) by UGC

DST-FIST Supported & Star College Scheme by DBT

Affiliated to Rani Durgavati Vishwavidyalaya, Jabalpur (M.P.)

References

Text Books:

- A Silberschatz , P.B Galvin , G. Gagne , Operating System Concepts, John Wiley Publications
- A.S Tanenbaum, Modern Operating System, Pearson Education
- J.L Peterson, Operating System Concepts Sumitabh Das, Linux, TMH

Reference Books:

- G.Nutt, Operating Systems: A Modern Perspective, Pearson Education
- W. Stallings, Operating Systems, Internals & Design Principles, Pearson Education
- M.Milenkovic, Operating Systems – Concepts and Design, Tata McGraw Hill

Web Links:

- <https://nptel.ac.in/courses/106/102/106102132/>
- <https://web.iitd.ac.in/~mythili/os/>
- <https://www.youtube.com/watch?v=aCJ3YgoolHQ>

List of Practical

1. Linux Directory Commands: pwd, mkdir, rm -rf, ls, cd, cd/, cd-
2. Linux File Commands: touch, cat, cat >, cat >>, rm, cp, mv, rename
3. Linux Permission Commands: su, id, useradd, passwd, groupadd, chmod, groupdel, chown, chgrp
4. Linux File Content & Filter Commands: head, tail, tac, more, less, grep, cat, cut, grep, comm, sed, tee, tr, uniq, wc, od, sort, diff
5. Linux Utility Commands: find, bc, locate, date, cal, sleep, time, df, mount, exit, clear, gzip, gunzip
6. Linux Networking Commands: ip, ssh, mail, ping, host
7. Edit Crontab file: to wall message on the system at a particular time automatically.
8. Vi editor: Create a file, edit, save and quit. Highlighting the searched term within a file, cut, yank, undo.
9. Write the Linux command to copy a File to some other location.
10. Write the Linux command to delete a file.



ST. ALOYSIUS' COLLEGE JABALPUR (MADHYA PRADESH)

Autonomous, Reaccredited 'A++' Grade by NAAC (CGPA 3.58/4.00)

College with Potential for Excellence (CPE) by UGC

DST-FIST Supported & Star College Scheme by DBT

Affiliated to Rani Durgavati Vishwavidyalaya, Jabalpur (M.P.)

Faculty of Science

Bachelor of Science (B.Sc.) VI Semester

SUBJECT: COMPUTER SCIENCE

Paper-Core

Data Science using Python

Course Outcomes

CO. No.	Course Outcomes	Cognitive Level
CO 1	Understand database concepts, applications, structure, the need for a database, and ER-Model terminologies.	U, A
CO 2	Be able to understand the fundamentals of Relational Algebra and relational calculus	K,U
CO 3	To gain skills in creating the logical design of databases, including the E R method and normalization approach.	U
CO 4	Know about SQL functions and operators	U, A
CO 5	Understand the knowledge of Database and transaction management.	U

Credit and Marking Scheme

	Credits	Marks		Total Marks
		Internal	External	
Theory	4	40	60	100
Practical	2	40	60	100
Total	6		200	

Evaluation Scheme

	Marks	
	Internal	External
Theory	3 Internal Exams of 20 Marks (During the Semester) (Best 2 will be taken)	1 External Exams (At the End of the Semester)
Practical	3 Internal Exams (During the Semester) (Best 2 will be taken)	1 External Exams (At the End of the Semester)



ST. ALOYSIUS' COLLEGE JABALPUR (MADHYA PRADESH)

Autonomous, Reaccredited 'A++' Grade by NAAC (CGPA 3.58/4.00)

College with Potential for Excellence (CPE) by UGC

DST-FIST Supported & Star College Scheme by DBT

Affiliated to Rani Durgavati Vishwavidyalaya, Jabalpur (M.P.)

Content of the Course

Theory

No. of Lectures (in hours per week): 2 Hrs. per week

Total No. of Lectures: 60 Hrs.

Maximum Marks: 60

Units	Topics	No. of Lectures
I	Introduction to Data Science, Data Science and Artificial Intelligence, Basic concept of data mining: KDD process and its steps, Types of data in data science, Data Science functionalities: Introduction to ML and its types Preparing Data, Data Preprocessing and its Needs, Data Cleaning, Data Integration and Transformation, Data Normalization, Data Reduction, Principal Component Analysis (PCA), Discretization and Concept Hierarchy Generation.	12
II	Association Rule Mining: Basic Concept of Support and Confidence, Apriori Algorithms for mining frequent item-sets. Improving the accuracy of Apriori Algorithm FP-Growth algorithm. Classification and Prediction: Decision Tree Induction, Bayesian Classification, KNN, And Classification by Backpropagation: Neural Network, ANN and SVM, Classifier Accuracy.	12
III	Cluster Analysis: Introduction, Partitioning Methods, Hierarchical Methods, Density-Based Methods, Outlier Analysis. Cluster Model accuracy. Python for Data Science, Data types in Python, Input-output statements in Python, Control statements in Python, arrays and functions in Python. Operators in Python	12
IV	List and its operation, Dictionary, Data analysis using Python- pandas, importing and reading a CSV sheet, basic exploration of data, converting a Python data structure to a data frame, numerical description of a data frame, understanding iloc() and loc(), tackling Null values, data frames(concatenating, merging, join), Binning with Pandas	12
V	Numpy, Data frames, Data visualization using Matplotlib, Python libraries for Data Science, scilab, scikit, tensor flow, Information extraction using NLP, NLTK library using NLP, Case study Sentimental Analysis, Reinforcement Learning. Case study: Prediction of the disease in health services by building a model.	12

References

Textbooks:

- Data Mining – Concepts and Techniques - Jiawei Han & Micheline Kamber Harcourt, India.
- Eric Matthes, Python Crash Course: A Hands-On, Project-Based Introduction to Programming (2nd Edition)



ST. ALOYSIUS' COLLEGE JABALPUR (MADHYA PRADESH)

Autonomous, Reaccredited 'A++' Grade by NAAC (CGPA 3.58/4.00)

College with Potential for Excellence (CPE) by UGC

DST-FIST Supported & Star College Scheme by DBT

Affiliated to Rani Durgavati Vishwavidyalaya, Jabalpur (M.P.)

- Zed A. Shaw Learn Python the Hard Way: 3rd Edition
- John M. Zelle Python Programming: An Introduction to Computer Science (3rd Edition)



ST. ALOYSIUS' COLLEGE JABALPUR (MADHYA PRADESH)

Autonomous, Reaccredited 'A++' Grade by NAAC (CGPA 3.58/4.00)

College with Potential for Excellence (CPE) by UGC

DST-FIST Supported & Star College Scheme by DBT

Affiliated to Rani Durgavati Vishwavidyalaya, Jabalpur (M.P.)

List of Practical

Max Marks = 100 (60 External+40 Internal)

1. Create a list of random numbers and classify them as discrete or continuous variables.
2. Convert a numerical variable into a categorical variable based on specific criteria.
3. Calculate the mean, mode, median, standard deviation, variance, covariance, and correlation of a given dataset.
4. Perform a regression analysis to determine the relationship between two numerical variables.
5. Use the pandas library to read a CSV file using the read_csv() function.
6. Use functions like head(), tail(), info(), and describe() to get an overview of the data.
7. Convert a Python list, dictionary, or NumPy array to a DataFrame using the pandas library.
8. Calculate statistical measures like mean, median, and standard deviation on DataFrame columns.
9. Use iloc() for integer-based indexing and loc() for label-based indexing to access specific rows or columns in a data frame.
10. Identify and handle missing or Null values using functions like isnull(), fillna(), or dropna().
11. Perform DataFrame operations like concatenating, merging, and joining multiple DataFrames using concat(), merge(), and join() functions.
12. Use NumPy functions for indexing, reshaping arrays, generating random values, and performing mathematical operations on arrays.



ST. ALOYSIUS' COLLEGE JABALPUR (MADHYA PRADESH)

Autonomous, Reaccredited 'A++' Grade by NAAC (CGPA 3.58/4.00)

College with Potential for Excellence (CPE) by UGC

DST-FIST Supported & Star College Scheme by DBT

Affiliated to Rani Durgavati Vishwavidyalaya, Jabalpur (M.P.)

Faculty of Science

Bachelor of Science (B.Sc.), VI Semester

SUBJECT: COMPUTER SCIENCE

Paper: DSE-IA

Subject: PHP and MySQL

Course Outcomes

CO. No.	Course Outcomes	Cognitive Level
CO 1	Develop a strong foundation in HTML, CSS, and JavaScript, enabling students to create and style dynamic web pages with text, links, tables, images, forms, and interactive elements.	U, R
CO 2	Gain proficiency in PHP, including its history, characteristics, installation, configuration, and language basics. Students can handle data types, variables, expressions, operators, control flow, and string manipulation effectively.	U, R, Ap
CO 3	Acquire skills in working with complex data structures such as arrays and multidimensional arrays. Understand and apply functions, object-oriented programming concepts (classes, objects, inheritance, polymorphism), and develop the ability to handle file operations and database access using PHP.	U, Ap, C
CO 4	Learn to set up web pages with PHP to handle various form elements and master file operations, including creating, reading, writing, renaming, deleting files, and managing file information.	An, Ap, C
CO 5	Master PHP for database access, including connecting to MySQL, creating databases and tables, and performing essential operations like inserting, updating, deleting, and selecting data.	U, Ap, C

Credit and Marking Scheme

	Credits	Marks		Total Marks
		Internal	External	
Theory	4	40	60	100
Practical	2	40	60	100
Total	6	200		

Evaluation Scheme

	Marks	
	Internal	External
Theory	3 Internal Exams of 20 Marks (During the Semester)(Best 2 will be taken)	1 External Exams (At the End of the Semester)
Practical	3 Internal Exams (During the Semester) (Best 2 will be taken)	1 External Exams (At the End of the Semester)



ST. ALOYSIUS' COLLEGE JABALPUR (MADHYA PRADESH)

Autonomous, Reaccredited 'A++' Grade by NAAC (CGPA 3.58/4.00)

College with Potential for Excellence (CPE) by UGC

DST-FIST Supported & Star College Scheme by DBT

Affiliated to Rani Durgavati Vishwavidyalaya, Jabalpur (M.P.)

**Bachelor of Science (B.Sc.)
VI Semester**

**Subject: Computer Science
Paper: DSE-IA, PHP and MySQL**

Content of the Course

No. of Lectures (in hours per week): 2 Hrs. per week

Total No. of Lectures: 60 Hrs.

Maximum Marks: 60

Units	Topics	No. of Lectures
I	Overview of HTML, Working with Text, Link, Table, Image, Forms, Input. Introduction of cascading style sheet, selector, inline, internal, external CSS, CSS in text, image. Overview of JavaScript, Variables, Operators, Control flow statements, Popup Boxes, Functions, Events, Windows and Document Objects, Array.	10
II	A Brief History of PHP, PHP Characteristics, Installing and Configuring PHP on Windows, PHP Language Basics: Lexical Structure, Data Types, Variables, Expressions and Operators, Decision Statements, Flow Control Statements, Embedding PHP in Web Pages. Strings: String Constants, Printing Strings, Accessing Individual Characters, String Handling Functions: length, Word count, string position, reverse, replace.	10
III	Arrays: Indexed Arrays, Associative Arrays, Identifying Elements of an Array, Storing Data in Arrays, Multidimensional Arrays, extracting multiple values, converting between arrays and variables, Traversing Arrays, Sorting. Functions: Calling a Function, defining a Function, Variable Scope, Function Parameters, Return Values, Variable Functions, Anonymous Functions. Object Oriented Programming Concepts: Classes, Objects, Member Functions, Encapsulations, Inheritance, and Polymorphism.	10
IV	Form Handling in PHP: Setting Up Web Pages to Communicate with PHP, Handling Text Fields, Text Areas, Check Boxes, Radio Buttons, List Boxes, Password Controls, Hidden Controls, Image Maps. File Handling: Working with files and directories, File Open and Read, File Create and Write, Reading and writing Character in file, reading entire file, Rename and Delete File, getting Information of files, ownership and permissions.	15
V	Database Access: Using PHP to access a database. Introduction to MySQL, Connect and create database, create tables, insert, update, delete, select.	15

References

Text Books:

- Programming PHP by Rasmus Lerdorf and Kevin Tatroe, O'Reilly Publications
- Beginning PHP5 by Wrox Publication
- HTML 5, Black Book by DreamTech Press

Reference Books:

- Mastering PHP: BPB Publication



ST. ALOYSIUS' COLLEGE JABALPUR (MADHYA PRADESH)

Autonomous, Reaccredited 'A++' Grade by NAAC (CGPA 3.58/4.00)

College with Potential for Excellence (CPE) by UGC

DST-FIST Supported & Star College Scheme by DBT

Affiliated to Rani Durgavati Vishwavidyalaya, Jabalpur (M.P.)

- PHP 5.1 for beginners by Evan Bayross and Sharman Shah, SPD Publications
- PHP 5.2 The Complete Reference by Steven Holzner, McGraw Hill Edition 2008.

Suggestive digital platforms/ web links:

- <https://www.w3schools.com/php/>
- <https://www.learn-php.org/>
- <https://www.javatpoint.com/php-tutorial> Part D-Assessment



ST. ALOYSIUS' COLLEGE JABALPUR (MADHYA PRADESH)

Autonomous, Reaccredited 'A++' Grade by NAAC (CGPA 3.58/4.00)

College with Potential for Excellence (CPE) by UGC

DST-FIST Supported & Star College Scheme by DBT

Affiliated to Rani Durgavati Vishwavidyalaya, Jabalpur (M.P.)

List of Practical

1. Write HTML codes for displaying images and demonstrate hyperlinking.
2. Create a Feedback Form Using Form Handling.
3. Write a code for design menu system using list tag.
4. Apply CSS formatting to create page.
5. Write a PHP script to display a Welcome message.
6. Write a PHP script to demonstrate use of arithmetic operators, comparison operators, and logical operators.
7. Write a PHP script to set the type of variable using type casting.
8. Write PHP Script to print the Fibonacci series.
9. Write PHP Script to generate results and display grades.
10. Write PHP Script to find the maximum number out of three given numbers.
11. Write PHP Script using two-dimensional arrays such as the addition of two 2×2 matrices.
12. Write PHP Script for FOR EACH loop execution.
13. Write PHP script Using the user-defined function.
14. Write PHP script to demonstrate use of string function.
15. Write PHP script to demonstrate use of date/time function and Math functions.
16. Write a program to read input data, from table and display all this information in tabular form on output screen.
17. Write a program to manipulate data and display all this information in table format.
18. Create form to search data.
19. Develop small PHP application(s) using forms and database with updated and delete options.
20. Open and Read a file.



ST. ALOYSIUS' COLLEGE JABALPUR (MADHYA PRADESH)

Autonomous, Reaccredited 'A++' Grade by NAAC (CGPA 3.58/4.00)

College with Potential for Excellence (CPE) by UGC

DST-FIST Supported & Star College Scheme by DBT

Affiliated to Rani Durgavati Vishwavidyalaya, Jabalpur (M.P.)

Faculty of Science

Bachelor of Science (B.Sc.), VI Semester

SUBJECT: COMPUTER SCIENCE

Paper- DSE IB

Cloud Computing

Course Outcomes

CO. No.	Course Outcomes	Cognitive Level
CO 1	Know the fundamentals of Cloud, Cloud Architecture, and types of services and Deployment Models.	U, R
CO 2	Understand the concept of virtualization and how this has enabled the development of Cloud Computing	R, U, Ap
CO 3	Understand Big Data technologies, HADOOP, Cloud databases and cloud security	U, R
CO 4	Explore some important cloud computing Open Source and Commercial Clouds Platforms.	U, An
CO 5	Solve a real-world problem using cloud computing through group collaboration.	U,An, Ap

Credit and Marking Scheme

	Credits	Marks		Total Marks
		Internal	External	
Theory	4	40	60	100
Practical	2	40	60	100
Total	6	200		

Evaluation Scheme

	Marks	
	Internal	External
Theory	3 Internal Exams of 20 Marks (During the Semester) (Best 2 will be taken)	1 External Exams (At the End of the Semester)
Practical	3 Internal Exams (During the Semester) (Best 2 will be taken)	1 External Exams (At the End of the Semester)



ST. ALOYSIUS' COLLEGE JABALPUR (MADHYA PRADESH)

Autonomous, Reaccredited 'A++' Grade by NAAC (CGPA 3.58/4.00)

College with Potential for Excellence (CPE) by UGC

DST-FIST Supported & Star College Scheme by DBT

Affiliated to Rani Durgavati Vishwavidyalaya, Jabalpur (M.P.)



ST. ALOYSIUS' COLLEGE JABALPUR (MADHYA PRADESH)

Autonomous, Reaccredited 'A++' Grade by NAAC (CGPA 3.58/4.00)

College with Potential for Excellence (CPE) by UGC

DST-FIST Supported & Star College Scheme by DBT

Affiliated to Rani Durgavati Vishwavidyalaya, Jabalpur (M.P.)

**Bachelor of Science (B.Sc.)
VI Semester**

**Subject: Computer Science
Paper: DSE-IB, Cloud Computing and Big Data**

No. of Lectures (in hours per week): 2 Hrs. per week

Total No. of Lectures: 60 Hrs.

Maximum Marks: 60

Units	Topics	No. of Lectures
I	Introduction to Cloud Computing: Overview, NIST Definition of Cloud Computing, NIST features, Historical Development, Need for Cloud Computing, Principles of Cloud Computing, Challenges and Risk of Cloud Computing, Advantages and Drawbacks. Cloud applications: Scientific Applications, Business and Consumer Applications, Productivity Applications, Online Social Networking Applications, and Media Applications.	12
II	Cloud Architecture and Model: Cloud Computing Architecture, Cloud Reference Model, NIST Cloud Computing Reference Architecture, IBM Cloud Computing Reference Architecture, Cloud Security Alliance (CSA) Reference Model. Service and Deployment Models: Infrastructure As A Service (IaaS), Platform As A Service (PaaS), Software As A Service (SaaS), Other Cloud Service Models, Public, Private, community and Hybrid Deployment Models.	12
III	Virtualization Technology: Meaning and Level of Virtualization, Hypervisor, Type 1 Hypervisor, Type 2 Hypervisors. Full virtualization, Para-virtualization, and Hardware Assisted Virtualization. Types of Virtualizations: Server Virtualization, Storage Virtualization, Network Virtualization, Operating System Virtualization, Application Server Virtualization, Creating A Virtual Machine.	12
IV	Big Data: Overview, Need of Big Data, Characteristics, Benefits of Big Data Processing, Big Data Technologies, HADOOP: Hadoop Architecture, Hadoop Ecosystem, HDFS Architecture. MapReduce. Cloud Database NoSQL: Relational, non-relational vs. DBaaS Cloud Database, Cloud Databases, Amazon Dynamo Database, HBase, Cassandra, MongoDB.	12
V	Cloud Security: Cloud Information Security Fundamentals, Cloud Security Services, Cloud Security Concerns, Security Challenges, Infrastructure Security, Cloud computing security architecture. Case Study Open-Source Clouds Platform: Hadoop, OpenStack, Cloud Stack, Eucalyptus, OpenNebula. Commercial Clouds Platform: Google App Engine, Microsoft Azure, Amazon	12

References

Text Books:

- Cloud Computing by Pawan Thakur, Susheela Pathania (Satya Prakashan New Delhi)
- Cloud Computing By Gautam Shroff (Cambridge Enterprise)



ST. ALOYSIUS' COLLEGE JABALPUR (MADHYA PRADESH)

Autonomous, Reaccredited 'A++' Grade by NAAC (CGPA 3.58/4.00)

College with Potential for Excellence (CPE) by UGC

DST-FIST Supported & Star College Scheme by DBT

Affiliated to Rani Durgavati Vishwavidyalaya, Jabalpur (M.P.)

- Cloud Computing: A Practical Approach by Antohy T Velte (McGraw Hill)
- Cloud Computing Bible by Barrie Sosinsky(Wiley India)

Reference Books:

- Bloor R., Kaufman M., Halper F. Judith Hurwitz “Cloud Computing for Dummies”, Wiley India Edition.
- John Rittinghouse & James Ransome, “Cloud Computing Implementation Management and SSategy”, CRC Press.
- Michael Miller, “Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online”.
- James E Smith, Ravi Nair, “Virtual Machines”, Morgan Kaufmann Publishers.



ST. ALOYSIUS' COLLEGE JABALPUR (MADHYA PRADESH)

Autonomous, Reaccredited 'A++' Grade by NAAC (CGPA 3.58/4.00)

College with Potential for Excellence (CPE) by UGC

DST-FIST Supported & Star College Scheme by DBT

Affiliated to Rani Durgavati Vishwavidyalaya, Jabalpur (M.P.)

List of Practical

1. Download and Install Virtual Machine (Virtual Box, VMware, and KVM)
2. Installing Virtual Machine
3. Controlling Virtual Machine (Start, restart, power off)
4. Editing Virtual Machine Hardware
5. Creating and Using Image Snapshots
6. Importing and Exporting Virtual Machine Images
7. Accessing Linux Command Line
8. Managing Files from the Command Line
9. Creating, Viewing, and Editing Text Files
10. Installing and Updating Software Packages



ST. ALOYSIUS' COLLEGE JABALPUR (MADHYA PRADESH)

Autonomous, Reaccredited 'A++' Grade by NAAC (CGPA 3.58/4.00)

College with Potential for Excellence (CPE) by UGC

DST-FIST Supported & Star College Scheme by DBT

Affiliated to Rani Durgavati Vishwavidyalaya, Jabalpur (M.P.)

Faculty of Science

Bachelor of Science (B.Sc.) VI Semester

Paper-DSE-IIA

Web Technology using .NET

Course Outcomes

CO. No.	Course Outcomes	Cognitive Level
CO 1	Understand the basics of the Internet, the World Wide Web (WWW), and Client-server Computing.	U, A
CO 2	Have Knowledge of various web browsers, familiarized with Java scripting, Client-side scripting language, Web server Architecture, Database Connectivity (DBC)	K
CO 3	Have knowledge of HTML, its essential tags, Attributes, Text styles, Links to External Documents and different sections of an HTML page.	U
CO 4	Develop skills to generate HTML and have knowledge of JavaScript and style sheets	U, An
CO 5	Have knowledge of Objects, Methods, Events and Functions and various types of text, styles	U

Credit and Marking Scheme

	Credits	Marks		Total Marks
		Internal	External	
Theory	3	40	60	100
Practical	1	40	60	100
Total	4	200		

Evaluation Scheme

	Marks	
	Internal	External
Theory	3 Internal Exams of 20 Marks (During the Semester) (Best 2 will be taken)	1 External Exams (At the End of Semester)
Practical	3 Internal Exams (During the Semester) (Best 2 will be taken)	1 External Exams (At the End of Semester)



ST. ALOYSIUS' COLLEGE JABALPUR (MADHYA PRADESH)

Autonomous, Reaccredited 'A++' Grade by NAAC (CGPA 3.58/4.00)

College with Potential for Excellence (CPE) by UGC

DST-FIST Supported & Star College Scheme by DBT

Affiliated to Rani Durgavati Vishwavidyalaya, Jabalpur (M.P.)

**Bachelor of Science (B.Sc.)
VI Semester**

**Subject: Computer Science
Paper: DSE-IIA, Web Technology using .NET**

No. of Lectures (in hours per week): 2 Hrs. per week

Total No. of Lectures: 60 Hrs.

Maximum Marks: 60

Units	Topics	No. of Lectures
I	Topics Basics of Internet and Web: The basics of the Internet, World Wide Web, Web page, Home Page, Web site, Static, Dynamic and Active web page, Client server computing concepts, Web Browser, Client-Side Scripting, Server-Side Scripting, Introduction to HTML, Tags and Attributes.	10
II	Introduction to Style Sheet- Types, Selector, properties. Introduction to JavaScript-variable, operators, function, events, Array, Strings, Dialog Boxes.	10
III	Introduction to .NET- .NET Framework, .NET Architecture, CLR, the Just-in-Time Compiler, Garbage collection, .NET Framework class library.	10
IV	Introduction to ASP.NET- ASP.NET Page Life Cycle, Coding Model, Web forms, Web form controls, server controls, client controls, web forms, coding Models, Controls: Textbox, Label, Hyperlink, Button, Dropdown List, List Box, Check Box, Radio Button, File Upload, Validators, Master page.	10
V	ASP.NET Navigation Controls: Sitemap Path, Menu Control, Tree View Working with Database- Architecture of ADO.NET, Connected and Disconnected Database. Connection Class, Command Class, Data Adapter Class, and Dataset Class. Insert, Update, delete commands, and access the data from the database. Data Controls: From View, Grid View, etc.	20

References

Text Books:

- Web Technologies — Black Book — DreamTech Press
- Beginning HTML, XHTML, CSS and Javascript by John Duckett

Reference Books:

- HTML, XHTML and CSS Bible, 5th edition, Willey India-Steven M. Schafer
- Java EE and HTML-5 Enterprise Application Development (Oracle Press) by John Brock, Arun Gupta, Geertjan Wielenga.

Web Links:

- Internet technology course by NPTEL< nptel.ac.in>courses,
- www.udemy.com



ST. ALOYSIUS' COLLEGE JABALPUR (MADHYA PRADESH)

Autonomous, Reaccredited 'A++' Grade by NAAC (CGPA 3.58/4.00)

College with Potential for Excellence (CPE) by UGC

DST-FIST Supported & Star College Scheme by DBT

Affiliated to Rani Durgavati Vishwavidyalaya, Jabalpur (M.P.)

List of Practical

1. Create a web form for addition of two numbers.
2. Create a web form for Simple Interest.
3. Create a web form for Factorial.
4. Create a web form for Prime number.
5. Create a web form for matching the value of two textboxes.
6. Create a web form for Calculator.
7. Create a web form for to demonstrate the session.
8. Create a web form with one list box and three check boxes named php, java, c respectively. On check and uncheck name of the check box should be added and removed to and from the list box.
9. Create a web form with one Drop Down List and demonstrate addition of items at first and last position. Show deletion also.
10. Demonstrate File Upload control.
11. Demonstrate Validation Controls.
12. Insert user data to Database through web form.
13. Create a sample college website and use Masterpage and Menu control.
14. Create Student Registration Form and corresponding database. Fetch the data into Grid View Control.





ST. ALOYSIUS' COLLEGE JABALPUR (MADHYA PRADESH)

Autonomous, Reaccredited 'A++' Grade by NAAC (CGPA 3.58/4.00)

College with Potential for Excellence (CPE) by UGC

DST-FIST Supported & Star College Scheme by DBT

Affiliated to Rani Durgavati Vishwavidyalaya, Jabalpur (M.P.)

Faculty of Science

Bachelor of Science (B.Sc.) VI Semester

Paper-DSE-IIB

Text Mining using NLP

Course Outcomes

CO. No.	Course Outcomes	Cognitive Level
CO 1	Analyze and apply morphological analysis techniques such as lemmatization, finite automata, and finite state transducers.	U, A
CO 2	Perform Part-of-Speech (POS) tagging using rule-based and stochastic methods, and understand sequence labeling with HMM and Maximum Entropy models.	K
CO 3	Understand lexical semantics and perform word sense disambiguation using various approaches including dictionary-based methods and WordNet.	U
CO 4	Apply selectional restrictions and word similarity techniques using thesaurus and distributional methods for improved pragmatics and word sense disambiguation.	U, An
CO 5	Conduct discourse analysis, including anaphora and coreference resolution, and utilize lexical resources such as Penn Treebank, WordNet, and FrameNet.	U

Credit and Marking Scheme

	Credits	Marks		Total Marks
		Internal	External	
Theory	3	40	60	100
Practical	1	40	60	100
Total	4	200		

Evaluation Scheme

	Marks	
	Internal	External
Theory	3 Internal Exams of 20 Marks (During the Semester) (Best 2 will be taken)	1 External Exams (At the End of the Semester)
Practical	3 Internal Exams (During the Semester) (Best 2 will be taken)	1 External Exams (At the End of the Semester)



ST. ALOYSIUS' COLLEGE JABALPUR (MADHYA PRADESH)

Autonomous, Reaccredited 'A++' Grade by NAAC (CGPA 3.58/4.00)

College with Potential for Excellence (CPE) by UGC

DST-FIST Supported & Star College Scheme by DBT

Affiliated to Rani Durgavati Vishwavidyalaya, Jabalpur (M.P.)

**Bachelor of Science (B.Sc.)
VI Semester**

**Subject: Computer Science
Paper: DSE-IIB, Text Mining using NLP**

No. of Lectures (in hours per week): 2 Hrs. per week

Total No. of Lectures: 60 Hrs.

Maximum Marks: 60

Units	Topics	No. of Lectures
I	History of NLP, Generic NLP system, levels of NLP, Knowledge in language processing, Ambiguity in Natural language, stages in NLP, challenges of NLP, Applications of NLP.	10
II	Morphology analysis –survey of English Morphology, Inflectional morphology & Derivational morphology, Lemmatization, Regular expression, finite automata, finite state transducers (FST), Morphological parsing with FST, Lexicon free FST Porter stemmer. N –Grams- N-gram language model, Self-learning topics: N-gram for spelling correction.	15
III	Part-Of-Speech tagging (POS)- Tag set for English (Penn Treebank), Rule-based POS tagging, Stochastic POS tagging, Issues –Multiple tags & words, Unknown words. Introduction to CFG, Sequence labeling: Hidden Markov Model (HMM), Maximum Entropy	10
IV	PRAGMATICS Selectional restrictions – Word Sense Disambiguation, WSD using Supervised, Dictionary & Thesaurus, Bootstrapping methods – Word Similarity using Thesaurus and Distributional methods.	10
V	Text summarization- LEXRANK, Optimization-based approaches for summarization, Summarization evaluation, Text classification. Sentiment Analysis introduction, Sentiment Analysis - Affective lexicons, Learning affective lexicons, Computing with affective lexicons, Aspect-based sentiment analysis.	15

TEXTBOOKS:

- Daniel Jurafsky, James H. Martin, “Speech and Language Processing: An Introduction to NaturalLanguageProcessing, Computational Linguistics and Speech”, Pearson Publication, 2014.
- Steven Bird, Ewan Klein and Edward Loper, “Natural Language Processing with Python, First Edition,O’Reilly Media, 2009.

REFERENCE BOOK:

- Breck Baldwin, “Language Processing with Java and LingPipe Cookbook”, Atlantic Publisher, 2015.
- Richard M Reese, “Natural Language Processing with Java”, O’Reilly Media, 2015.



ST. ALOYSIUS' COLLEGE JABALPUR (MADHYA PRADESH)

Autonomous, Reaccredited 'A++' Grade by NAAC (CGPA 3.58/4.00)

College with Potential for Excellence (CPE) by UGC

DST-FIST Supported & Star College Scheme by DBT

Affiliated to Rani Durgavati Vishwavidyalaya, Jabalpur (M.P.)

List of Practical

1. Design and implement an NLP pipeline that performs tokenization, lemmatization, POS tagging, and named entity recognition on a given text corpus.
2. Develop a morphological parser using finite state transducers (FST) for English words, and demonstrate its ability to handle inflectional and derivational morphology.
3. Construct an N-gram language model for a given text corpus and use it to perform tasks such as next-word prediction and spelling correction.
4. Implement rule-based and stochastic POS tagging on a sample text, and evaluate the accuracy of each method using the Penn Treebank tag set.
5. Train a Hidden Markov Model (HMM) for POS tagging and use it to tag a new text. Compare its performance with a Maximum Entropy model.
6. Implement a word sense disambiguation system using dictionary-based and supervised learning approaches. Evaluate the system on a set of ambiguous sentences.
7. Use WordNet to explore relationships among lexemes (homonymy, polysemy, synonymy, hyponymy) and implement a robust word sense disambiguation algorithm.
8. Perform discourse segmentation and anaphora resolution using Hobbs and Centering algorithms on a given text. Analyze the coherence and reference phenomena in the discourse.
9. Implement a text summarization system using LEXRANK or an optimization-based approach. Evaluate the summarization quality using standard evaluation metrics.
10. Develop an aspect-based sentiment analysis system that uses affective lexicons to analyze customer reviews. Implement the system and evaluate its accuracy on a given dataset.



ST. ALOYSIUS' COLLEGE JABALPUR (MADHYA PRADESH)

Autonomous, Reaccredited 'A++' Grade by NAAC (CGPA 3.58/4.00)

College with Potential for Excellence (CPE) by UGC

DST-FIST Supported & Star College Scheme by DBT

Affiliated to Rani Durgavati Vishwavidyalaya, Jabalpur (M.P.)

Faculty of Science

Bachelor of Science (B.Sc.), Honours/Research, IV Year

Paper-Core I

Subject: Computer Science

Internet of Things (IoT)

Course Outcomes

CO. No.	Course Outcomes	Cognitive Level
CO 1	Understand the basic concepts of the IoT.	U
CO 2	Use of Devices, Gateways and Communication in IoT.	U, R
CO 3	Learn Arduino and Python Programming	Ap, AN, U
CO 4	Implement IoT with Raspberry Pi.	Ap, U
CO 5	Explore the relationship between IoT, cloud computing, and data analytics.	U, R

Credit and Marking Scheme

	Credits	Marks		Total Marks
		Internal	External	
Theory	4	30	70	100
Practical	2	30	70	100
Total	6	200		

Evaluation Scheme

	Marks	
	Internal	External
Theory	3 Internal Exams of 20 Marks (During the Semester) (Best 2 will be taken)	1 External Exams (At the End of the Semester)
Practical	3 Internal Exams (During the Semester) (Best 2 will be taken)	1 External Exams (At the End of the Semester)





ST. ALOYSIUS' COLLEGE JABALPUR (MADHYA PRADESH)

Autonomous, Reaccredited 'A++' Grade by NAAC (CGPA 3.58/4.00)

College with Potential for Excellence (CPE) by UGC

DST-FIST Supported & Star College Scheme by DBT

Affiliated to Rani Durgavati Vishwavidyalaya, Jabalpur (M.P.)

**Bachelor of Science (B.Sc.)
IV Year**

**Subject: Computer Science
Paper: Core -I ,IoT**

No. of Lectures (in hours per week): 2 Hrs. per week

Total No. of Lectures: 60 Hrs.

Maximum Marks: 60

Units	Topics	No. of Lectures
I	Introduction to IoT: Definition, Characteristics, Applications, Evolution, Enablers, Connectivity Layers, Addressing, Networking and Connectivity Issues, Network Configurations, Multi -Homing, Sensing: Sensors and Transducers, Classification, Different Types of Sensors, Errors, Actuation: Basics, Actuator Types- Electrical, Mechanical Soft Actuators	12
II	Networking - Introduction, Basics of Networking, Communication Protocols, Sensor Networks. Machine to Machine Communication - IoT Components, Inter-Dependencies, So A, Gateways, Comparison Between IoT & Web, Difference Protocols, Complexity of Networks, Wireless Networks, Scalability, Protocol Classification, MQTI & SMQTI, IEEE 802.15.4, Zigbee)	08
III	Arduino Programming: Interoperability In IoT, Introduction to Arduino Programming, Integration of Sensors and Actuators with Arduino.	10
IV	Python Programming and Raspberry Pi: Introduction to Python Programming, Introduction to Raspberry Pi, Implementation of IoT with Raspberry Pi.	12
V	Data Analytics and Cloud Computing: Data Handling and Analytics, Cloud Computing Fundamentals, Cloud Computing Service Model, Cloud Computing Service Management and Security, Sensor-Cloud Architecture, View and Dataflow.	08
VI	FOG Computing and Case Studies: FOG Computing: Introduction, Architecture, Need, Applications and Challenges Industrial IoT, Case Studies: Agriculture, Healthcare, Activity Monitoring.	10

References

Textbooks, Reference Books, Other Resources

- Internet of Things: Architecture and Design Principles, by Rajkamal, Mc Graw Hill India, 2017
- The Internet of Things: Enabling Technologies, Platforms, and Use Cases", by Pethuru Raj and Anupama C. Raman (CRC Press).
- Internet of Things: A Hands-on Approach", by A Bah_ga and Vijay Madiseti (Universities Press)



ST. ALOYSIUS' COLLEGE JABALPUR (MADHYA PRADESH)

Autonomous, Reaccredited 'A++' Grade by NAAC (CGPA 3.58/4.00)

College with Potential for Excellence (CPE) by UGC

DST-FIST Supported & Star College Scheme by DBT

Affiliated to Rani Durgavati Vishwavidyalaya, Jabalpur (M.P.)

List of Practical

Note: Familiarization with Arduino/Raspberry Pi/Python and perform necessary software installation:

1. To interface LED/Buzzer with Arduino/Raspberry Pi and write a program to turn ON LED for 1 sec after every 2 seconds.
2. To interface Push button/Digital sensor (IR/LOR) with Arduino/Raspberry Pi and write a program to turn ON LED when push button is pressed or at sensor detection.
3. To interface DHT 11 sensor with Arduino/Raspberry Pi and write a program to print temperature and humidity readings.
4. To interface motor using relay with Arduino/Raspberry Pi and write a program to turn ON motor when push button is pressed.
5. To interface OLED with Arduino/Raspberry Pi and write a program to print temperature and humidity readings on it.
6. To interface Bluetooth with Arduino/Raspberry Pi and write a program to send sensor data to smartphone using Bluetooth.
7. To interface Bluetooth with Arduino/Raspberry Pi and write a program to turn LED ON/OFF when 'I/O' is received from smartphone using Bluetooth.
8. Write a program on Arduino/Raspberry Pi to upload temperature and humidity data to things peak cloud.
9. Write a program on Arduino/Raspberry Pi to retrieve temperature and humidity data from things speak cloud.





ST. ALOYSIUS' COLLEGE JABALPUR (MADHYA PRADESH)

Autonomous, Reaccredited 'A++' Grade by NAAC (CGPA 3.58/4.00)

College with Potential for Excellence (CPE) by UGC

DST-FIST Supported & Star College Scheme by DBT

Affiliated to Rani Durgavati Vishwavidyalaya, Jabalpur (M.P.)

Faculty of Science

Bachelor of Science (B.Sc.), VI Semester

SUBJECT: COMPUTER SCIENCE

CORE PAPER-II

ARTIFICIAL INTELLIGENCE

Course Outcomes

CO. No.	Course Outcomes	Cognitive Level
CO1	Understand the basic concepts and interdisciplinary nature of AI.	U
CO2	Develop the problem-solving proficiency using AI.	A
CO3	Deeply understand the various search algorithms.	U
CO4	Develop skills in knowledge representation and their applications in handling uncertainty.	A
CO5	Gain a fundamental understanding of machine learning, and their practical applications.	U
CO6	Acquire skill in Prolog programming.	A
CO7	Explore advanced knowledge representation techniques.	U
CO8	Develop an awareness of ethical considerations in AI.	U
CO9	Cultivate critical thinking skills to analyze and evaluate AI algorithms and systems.	An, E
CO10	Apply AI concepts and techniques to diverse domains.	A, U

Credit and Marking Scheme

	Credits	Marks		Total Marks
		Internal	External	
Theory	4	30	70	100
Practical	2	30	70	100
Total	6		200	

Evaluation Scheme

	Marks	
	Internal	External
Theory	3 Internal Exams of 10 Marks (During the Semester)	1 External Exams (At the End of the Semester)



ST. ALOYSIUS' COLLEGE JABALPUR (MADHYA PRADESH)

Autonomous, Reaccredited 'A++' Grade by NAAC (CGPA 3.58/4.00)

College with Potential for Excellence (CPE) by UGC

DST-FIST Supported & Star College Scheme by DBT

Affiliated to Rani Durgavati Vishwavidyalaya, Jabalpur (M.P.)

**Bachelor of Science (B.Sc.)
IV Year**

**Subject: Computer Science
Paper: Core -II, Artificial Intelligence**

No. of Lectures (in hours per week): 2 Hrs. per week

Total No. of Lectures:

Maximum Marks:

Units	Topics	No. of Lectures
I	Introduction to AI, State Space Search, Water Jug Problem, Missionaries and Cannibals Problem, BFS, DFS.	10
II	Best First Search, A Star Search, And or Graph, Constraints Satisfaction Problem, I Minimax Search, Alpha Beta Cut Off, Branch and Bound.	10
III	Introduction to Knowledge Representation, Knowledge Agent, Predicate Knowledge, Introduction to Rule-Based System, Forward and Backward Chaining, Application of Rule-Based System I, Application of Rule-Based System Uncertainty II.	10
IV	HMM Model, Conceptual Dependency, Semantic Network, Resolution Principal, DST, Introduction to Machine Learning.	10
V	Supervised learning, Unsupervised Learning, Evolution of Algo, NLP, Need and Justification of Expert Systems, Introduction to Expert System.	10
VI	Introduction to Prolog, List in Prolog, Recursion in Prolog, Union and Intersection in Prolog, learning and planning, Parsing in AI.	10

References

Text Books:

- Stuart Russell and Peter Norvig., “Artificial Intelligence: A Modern Approach”, Pearson
- Ivan Bratko., “Prolog Programming for Artificial Intelligence, Addison-Wesley”
- Tom M. Mitchell, “Machine Learning”, McGraw-Hill

Web Links:

- Coursera: <https://www.coursera.org/>
- edX: <https://www.edx.org/>
- Udacity: <https://www.udacity.com/>
- Kaggle: <https://www.kaggle.com/>
- GitHub: <https://github.com/>
- MIT OCW - Introduction to Artificial Intelligence <https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-034-artificial-intelligence-fall-2005/>
- Stanford Online: Machine Learning - <https://online.stanford.edu/courses/soe-ymcs-ai003>
- Machine Learning Book pdf: <https://www.cin.ufpe.br/~cavmj/Machine%20-%20Learning%20-%20Tom%20Mitchell.pdf>
- DeepLearning.AI - Andrew Ng's Specialization on



ST. ALOYSIUS' COLLEGE JABALPUR (MADHYA PRADESH)

Autonomous, Reaccredited 'A++' Grade by NAAC (CGPA 3.58/4.00)

College with Potential for Excellence (CPE) by UGC

DST-FIST Supported & Star College Scheme by DBT

Affiliated to Rani Durgavati Vishwavidyalaya, Jabalpur (M.P.)

Coursera: <https://vww.coursera.org/specializations/deep-learning>

- UCI Machine Learning Repository: <https://archive.ics.uci.edu/ml/index.php>
- Rule-Based Systems on GitHub: <https://github.com/>
- Natural Language Processing with NLTK – <https://www.nltk.org/>
- TensorFlow Tutorials: <https://www.tensorflow.org/tutorials>

Suggested equivalent online courses

- https://onlinecourses.swayam2.ac.in/nou24_cs07

List of Practical

1. Implement a simple state Space search algorithm to solve problems like the Water Jug Problem.
2. Apply Breadth-First Search (BFS) and Depth-First Search (DFS) to solve the Missionaries and Cannibals Problem.
3. Implement the Hill Climbing algorithm to solve a problem with a heuristic function.
4. Compare and implement Best First Search and A* Search algorithms on a problem with an admissible heuristic.
5. Build an And/Or graph and solve a problem using it.
6. Implement a constraint satisfaction problem and solve it using backtracking.
7. Create a game scenario and implement Minimax Search with Alpha Beta cut-off for efficient game tree traversal.
8. Apply the Branch and Bound algorithm to solve a combinatorial optimization problem.
9. Explore different knowledge representation techniques and implement them.
10. Develop a rule-based system using both forward and backward chaining.
11. Extend the rule-based system to handle uncertainty in decision making.
12. Implement an HMM for a simple sequence prediction problem.
13. Develop a system using conceptual dependency or semantic network for knowledge representation.
14. Explore resolution principle and apply DST in a logical reasoning scenario.
15. Implement a basic supervised learning algorithm on a dataset.
16. Apply unsupervised learning algorithms on a dataset and analyze the results.
17. Trace the historical development of machine learning algorithms and discuss their evolution.
18. Implement a basic NLP task such as sentiment analysis or text classification.
19. Discuss the need and justification for expert systems in various domains.
20. Learn and implement basic Prolog programs for list manipulation.
21. Apply recursion in Prolog and implement operations like union and intersection on sets.
22. Explore how learning is integrated into planning in AI.
23. Implement a basic parsing algorithm for a simple language.





ST. ALOYSIUS' COLLEGE JABALPUR (MADHYA PRADESH)

Autonomous, Reaccredited 'A++' Grade by NAAC (CGPA 3.58/4.00)

College with Potential for Excellence (CPE) by UGC

DST-FIST Supported & Star College Scheme by DBT

Affiliated to Rani Durgavati Vishwavidyalaya, Jabalpur (M.P.)

Faculty of Science

Bachelor of Science (B.Sc.), IV Year

SUBJECT: COMPUTER SCIENCE

Paper- Discipline Specific Elective-I

Computing with Scilab

Course Outcomes

CO. No.	Course Outcomes	Cognitive Level
CO 1	Implement the concept of vectors & matrices in Scilab programming.	U, A
CO 2	Able to apply the programming concepts like branching, iteration & functions in a Scilab program.	K
CO 3	Use the inbuilt functions of Scilab for trigonometric & statistical calculations.	U
CO 4	Analyze and visualize the data through various 2-D and 3-D plots.	U, An
CO 5	Apply Scilab tools in modeling and simulations.	U, Ap
CO 6	Use Scicos visual editor (Xcos)/Simulink Editor in various simulations of scientific importance.	

Credit and Marking Scheme

	Credits	Marks		Total Marks
		Internal	External	
Theory	3	40	60	100
Practical	1	40	60	100
Total	4	200		

Evaluation Scheme

	Marks	
	Internal	External
Theory	3 Internal Exams of 20 Marks (During the Semester) (Best 2 will be taken)	1 External Exams (At the End of the Semester)
Practical	3 Internal Exams (During the Semester) (Best 2 will be taken)	1 External Exams (At the End of the Semester)





ST. ALOYSIUS' COLLEGE JABALPUR (MADHYA PRADESH)

Autonomous, Reaccredited 'A++' Grade by NAAC (CGPA 3.58/4.00)

College with Potential for Excellence (CPE) by UGC

DST-FIST Supported & Star College Scheme by DBT

Affiliated to Rani Durgavati Vishwavidyalaya, Jabalpur (M.P.)

;

**Bachelor of Science (B.Sc.)
IV Year**

**Subject: Computer Science
Paper: DSE -I, Computing with Scilab**

No. of Lectures (in hours per week): 2 Hrs. per week

Total No. of Lectures: 60 Hrs.

Maximum Marks: 60

Units	Topics	No. of Lectures
I	Introduction to Scilab: What is Scilab, the environment of Scilab. Command prompt, Scilab as an interactive calculator, script editor, some useful commands for directory file's view: pwd, who, whos, ls, dir, cd; clearing command window: clc, clearing variables: clear. Data types and Special variables: Fundamental data type and object data types, arrays and matrices, operators (arithmetic, relational & logical), predefined special variables/constants: imaginary number, Euler's constant, pi (π), infinity, not a number (NaN). Working with Arrays and Matrices: Defining variables as a matrix, accessing an element, a row, a column, and a submatrix of a matrix. Create a row vector and column vector using the colon operator. Matrix operations: addition(+), subtraction(-), transpose(), multiplication(*), left division(\), right division(/), exponent(^), elementwise multiplication(.*), elementwise left division(.\), elementwise right division(/.), elementwise exponent(.^); functions to find inverse(inv), determinant (det), diagonal (diag), trace(trace), upper triangular (triu), lower triangular(tril) and eigenvalue (spec). Array operations vs matrix operations. length, size of matrix functions. Special matrices: All element zeros: zeros (m,n), all element ones: ones(m,n), identity matrix: eye(m,n), random number matrix: rand(m,n).	10
II	Scilab Programming Language: Scripting in Scilab, comment, conditional branching (if..else), switch, loops (while, do ... while, for). User-defined functions. Inbuilt Scilab functions: Trigonometric: sin(), sind(), cos(), cosd(), tan(), tand(), sinh(), cosh(), tanh(), acos(), asin(), atan(). Statistical: max(), min(), sum(), mean(), stdev(), median(), correl(), variance(), cov(), covar(), princomp(), reglin(). Cell: Cell() and Data Structures: Struct() in Scilab. Computation through Scilab/: Solving linear algebraic equations through matrix method, Gauss Elimination, LU decomposition and partial pivoting, Iterative methods: Gauss Siedel Method.	10
III	Data Visualization with 2-D and 3-D Plots: Creating 2-D Plots: The plots command plot(), plotting multiple graphs in the same figure. Various other 2D plots:	10



ST. ALOYSIUS' COLLEGE JABALPUR (MADHYA PRADESH)

Autonomous, Reaccredited 'A++' Grade by NAAC (CGPA 3.58/4.00)

College with Potential for Excellence (CPE) by UGC

DST-FIST Supported & Star College Scheme by DBT

Affiliated to Rani Durgavati Vishwavidyalaya, Jabalpur (M.P.)

	<p>Histograms: <code>histplot()</code>, pie chart: <code>pie()</code>, bar chart: <code>bar()</code>, horizontal bar chart: <code>barh()</code>, polar plot: <code>polarplot()</code>, 2D plot of a matrix using color: <code>matplot()</code>, counter plot: <code>contour2d()</code>, <code>contourf()</code>, scatter plot: <code>scatter()</code>, add error bar on 2D plot: <code>errorbar()</code>. Creating 3-D Plots: Surface plot: <code>surf()</code>, <code>plot3d()</code>, contour plot: <code>contour()</code>, mesh plot: <code>mesh()</code>, 3D histogram: <code>hist3d()</code>. Managing the properties and attributes of figure/plot: <code>title</code>, <code>xlabel</code>, <code>ylabel</code>, legends, font and font color, line color, line width, aspect ratio, background color and other properties of figure/plots. File operations in Scilab: Importing/exporting data in CSV format and spreadsheet files. Saving and loading variables.</p>	
IV	<p>Working with polynomial: <code>poly()</code>, <code>residue()</code>, <code>roots()</code>, <code>detr()</code>, <code>degree()</code>, <code>coeff()</code>. Interpolation: Linear interpolation, cubic spline interpolation, smoothing by spline functions, weighted least squares cubic spline fitting. Solving differential equations: Differential algebraic equations solver, differential algebraic equation, DAE solver with zero crossing, boundary value problems. Solving Ordinary Differential Equations: Ordinary differential equation solver, ordinary differential equation solver with roots finding, discrete/continuous Cauchy integral, integration of experimental data by spline interpolation, integration of experimental data by trapezoidal interpolation.</p>	10
V	<p>Scicos/Simulink Introduction: Construction of a Simple Diagram, Running Scicos, editing a Model, Diagram Simulation, Changing Block Parameters (developing SIR model spread of Disease), Symbolic Parameters and Context, Hierarchy: Placing a Super Block in a Diagram, Editing a Super Block. Save and Load: Scicos File Formats, Super Block and Palette, Synchronism, and Special Blocks. Scicos/Simulink Formalism: Activation Signal: Block Activation, Activation Generation, Inheritance, Always Active Blocks, Constant Blocks, Conditional Blocks.</p>	10
VI	<p>Scicos Visual Editor (Xcos)/SimuJink Editor: Types of Palettes: Source & Sink Palettes, Continuous time systems, Discontinuities, Discrete-time systems, Branching Palettes, Event handling Palettes, Lookup Tables, Matrix Palettes, Mathematical Operations, Electrical, Implicit, Demonstration Blocks, User-defined functions, etc. Demo Simulations: Simple demo of Sin & Cos, Bouncing Ball model, Signal builder, Fibonacci Numbers, Xcos data type, If Block, etc.</p>	10

References

Text Books:



ST. ALOYSIUS' COLLEGE JABALPUR (MADHYA PRADESH)

Autonomous, Reaccredited 'A++' Grade by NAAC (CGPA 3.58/4.00)

College with Potential for Excellence (CPE) by UGC

DST-FIST Supported & Star College Scheme by DBT

Affiliated to Rani Durgavati Vishwavidyalaya, Jabalpur (M.P.)

- Stephen L. Campbell, Jean-Philippe Chancelier and Ramine Nikouk.hah, "Modeling and Simulation in Scilab/Scicos", 2010, Springer
- ACHUTHSANKAR S. NAIR, SCILAB (A Free Software To MATLAB), Kindle Edition, (2011).
- Sandeep Nagar, Introduction to Scilab: For Engineers and Scientists, (2017), Kindle Edition, Apress
- Satish Annigeri, Introduction to Scilab, 2009, scilab.org.

Reference Books:

- Rachna Verma & Arvind Kumar Verma, "Introduction to Scilab", 2018, ebook on Kindle
- Editors: Gomez, Claude (Ed.), Engineering and Scientific Computing with Scilab, ISBN 978-1-4612-1584-4

List of Practical

A) Matrix Construction and Manipulation:

- Use following set of functions for creating matrices: 'and.', diag, eye, grand, int, linspace or ':', logspace, matrix, ones, rand, zeros, .*.
- Extraction, Insertion, and Deletion in the matrix
- Elementary Matrix Operations: Transpose, Multiplication, Kronecker product, etc
- Use of string matrix functions: ascii, execstr, grep, part, msscanf, msprintf, strindex, string, strcat, length, etc.
- Boolean Matrices
- Polynomial Matrices
- Lists: list, tlist, and mlist functions

B) Scilab Programming:

- Creating files with extensions .sci and .see
- **Branching:**
 - o if <condition> then <instruction> end
 - o if <condition> then <instruction> else <instruction> end
- **Iterations**
 - o for <name> = <expr>
 - <instructions>
 - End
- **Functions**



ST. ALOYSIUS' COLLEGE JABALPUR (MADHYA PRADESH)

Autonomous, Reaccredited 'A++' Grade by NAAC (CGPA 3.58/4.00)

College with Potential for Excellence (CPE) by UGC

DST-FIST Supported & Star College Scheme by DBT

Affiliated to Rani Durgavati Vishwavidyalaya, Jabalpur (M.P.)

```
o function [<name1>, <name2>, ...]=<name-of-function> (<arg1>, <arg2>, ...)  
<instructions>  
endfunction
```

- **Calling a function:** Through using keywords like - varargin, varargout
- **Input and Output Functions:** Display of Variables (disp or print)
- **Formatted Input and Output functions:** fprintf, fprintf, sprintf, fscanf, fscanf, msscanf, [printjMat, fscanfMat, mgetl, mputl, mopen&mclose.
- **Input Output in Binary Mode:** mget, mput, mgetstr, mtell, mseek, meof
 - **Graphical User Interface:** addmenu, de/menu, setmenu, or unsetmenu, x_choose, x_dialog, x_choices, etc

C) Basic Graphing:

Scilab graphic commands and their visible properties: plot2d, plot2d(x,y), plot2d2, plot2d3, plot2d4, elf, subplot, plot3d, fplot3d(x,y,f), param3d, param3dl, paramfplot2d, sfgrayplot, sgrayplot, histplot, hist3d, isoview, legends, matplot, polarplot, xrect, xrects, xpoly, polys, xfpolys, get, gdf() &gda(), sda(), etc. along with the graphics primitives.

D) Modeling and Simulation in Scilab:

Application of the following tools will be discussed in the Lab:

- Ordinary Differential Equations [ode{type}, odeoptionst), ode_root]
- Boundary Value Problems [bvode]
- Difference Equations
- Differential Algebraic Equations [dasrt, dass[]]
- Hybrid Systems [odedc]

E) SCICOS/Simulink

- Familiarisation with Scicos/Simulink and its Blocks
- Developing SIR Model for Spread of Disease
- Source & Sink Palettes:
 - o Sinusoid generator
 - o Saw tooth generator
 - o Square wave generator
 - o Activation Clock (red clock)



ST. ALOYSIUS' COLLEGE JABALPUR (MADHYA PRADESH)

Autonomous, Reaccredited 'A++' Grade by NAAC (CGPA 3.58/4.00)

College with Potential for Excellence (CPE) by UGC

DST-FIST Supported & Star College Scheme by DBT

Affiliated to Rani Durgavati Vishwavidyalaya, Jabalpur (M.P.)

- o Scope blocks and display blocks
- o Clock generator & Step generator

- Linear and Non-Linear Palettes:
 - o Sum (block) can be used to sum and/or subtract signals
 - o Gain can be used to achieve multiplication by a constant
 - o Integrator is used to time-integrate signals
 - o PID is a PID controller (Proportional+ Integral + Derivative)
 - o Continuous fix delay (Time delay) represents a time delay
 - o Continuous-time (Laplace transform) transfer function o Discrete-time (z-transform) transfer function
 - o Unit delay block (with symbol $1/z$ inside) which implement delay of one-time step.
 - o Mathematical Expression - used to implement any Scilab function.
 - o Product - used to implements multiplication or division.
 - o Lookup tables - Interp implements interpolation or table lookup between tabular data.

- **Branching Palettes:** Select, Mux, Demux, Switch, Goto, Relay, etc

- **Event Palettes:** Clock, Endblk, End, Halt, Andblk, SampleCLK, etc

- **Demo Simulation:** Bouncing Ball Model, etc

- Standard demos: Simple demo of sinus & square wave, Signal builder, Fibonacci Numbers, Xcos/Simulink data types, If Block. Zero Crossing, Goto/From Block.





ST. ALOYSIUS' COLLEGE JABALPUR (MADHYA PRADESH)

Autonomous, Reaccredited 'A++' Grade by NAAC (CGPA 3.58/4.00)

College with Potential for Excellence (CPE) by UGC

DST-FIST Supported & Star College Scheme by DBT

Affiliated to Rani Durgavati Vishwavidyalaya, Jabalpur (M.P.)

Faculty of Science

Bachelor of Science (B.Sc.) IV Year

SUBJECT: COMPUTER SCIENCE

Paper-DSE-II

Linux Server Administration

Course Outcomes

CO. No.	Course Outcomes	Cognitive Level
CO 1	Write shell programs for simple problems.	U, A
CO 2	Use basic commands of Linux.	R, An, Ap
CO 3	Manage user accounts in Linux.	U, Ap
CO 4	Analyze the need for security measures for Linux servers.	U, An
CO 5	Install and configure Email Server, DNS, FTP, etc.	Ap

Credit and Marking Scheme

	Credits	Marks		Total Marks
		Internal	External	
Theory	3	40	60	100
Practical	1	40	60	100
Total	4		200	

Evaluation Scheme

	Marks	
	Internal	External
Theory	3 Internal Exams of 20 Marks (During the Semester) (Best 2 will be taken)	1 External Exams (At the End of Semester)
Practical	3 Internal Exams (During the Semester) (Best 2 will be taken)	1 External Exams (At the End of Semester)





ST. ALOYSIUS' COLLEGE JABALPUR (MADHYA PRADESH)

Autonomous, Reaccredited 'A++' Grade by NAAC (CGPA 3.58/4.00)

College with Potential for Excellence (CPE) by UGC

DST-FIST Supported & Star College Scheme by DBT

Affiliated to Rani Durgavati Vishwavidyalaya, Jabalpur (M.P.)

**Bachelor of Science (B.Sc.)
IV Year**

**Subject: Computer Science
Paper: DSE -II , Linux Server Administration**

No. of Lectures (in hours per week): 2 Hrs. per week

Total No. of Lectures: 60 Hrs.

Maximum Marks: 60

Units	Topics	No. of Lectures
I	Linux introduction and file system - basic features, different flavors of Linux. Advantages, how Linux access files, storage files, and Linux standard directories. Commands for files and directories cd, ls, cp, md, rm, mkdir, rmdir, pwd, file, more, less, creating and viewing files using cat, file comparisons — cmp& comm, view files, disk related commands, checking disk free spaces.	10
II	Linux Shell - Understanding shells, Processes in Linux, connecting processes with pipes, redirecting input-output, manual help, Background processing, managing multiple processes, changing process priority with nice, scheduling of processes at command, cron commands, kill, ps, who, sleep, Printing commands, touch, file related commands - we, cut, dd, etc. Mathematical commands bc, expr. Creating and editing files with vi& vim editor. Simple filter commands: pr, head, tail, cut, paste, sort, uniq, tr. Filter using regular expressions: grep, egrep, and sed.	10
III	Introduction to shell programming: develop some shell programs. System administration: common administrative tasks, configuration and log files, role of the system administrator. Installing requirements, partitioning the hard drive for Linux, installing the Linux system, system startup and shut down process.	10
IV	Managing user accounts & deleting users, changing permissions and ownerships, creating and managing groups, modifying group attributes, temporarily disabling user's accounts, creating and mounting file systems, file security & permissions, becoming super user using su. Host name, disk partitions & sizes, users, kernel. Backup and restore files, installing and removing packages.	10
V	Starting & using KDE & GNOME graphical interfaces. Basic networking: setting up a LAN using LINUX, choosing peer to peer vs client/server model, setting up an Ethernet LAN, configuring host computers, checking Ethernet connecting, connecting to the internet, common networking administrative tasks, configuring Ethernet, initializing Ethernet interface, ifconfig, netstat and netconfig commands, TCP/IP network, DNS services. Servers - Installation, configuration & Administration of the following servers in Linux: Mail server, DNS, Remote access, FTP server, Apache web server, VNC Server.	20

References

Textbooks:

- Red Hat RHCSA/RHCE 7 Cert Guide: Red Hat Enterprise Linux 7 by Sander van Vugt.
- Cristopher Negus: Red Hat Linux Bible, Wiley Dreamtech India.



ST. ALOYSIUS' COLLEGE JABALPUR (MADHYA PRADESH)

Autonomous, Reaccredited 'A++' Grade by NAAC (CGPA 3.58/4.00)

College with Potential for Excellence (CPE) by UGC

DST-FIST Supported & Star College Scheme by DBT

Affiliated to Rani Durgavati Vishwavidyalaya, Jabalpur (M.P.)

- Christopher Negus, Fedora 9 And Red Hat Enterprise Linux Bible, **Wiley India Ltd.**

Reference Books:

- Official Red Hat Linux Users guide by Redhat, Wiley Dreamtech India
- Linux Administration, Kogent Learning Solutions Inc., Dreamtech.
- Forouzan, Unix & Shell Programming, Cengage Publications.

Web Links:

- <https://nptel.ac.in/courses/117/106/117106113/>
- <https://web.iitd.ac.in/~minati/MTL458.html>
- <https://wv-w.cse.iitb.ac.in/~mythili/os/>
- <https://www.youtube.com/watch?v=aC.13YgoolHQ>
- <https://archlinux.org/>
- https://access.redhat.com/documentation/en-us/red_hat_enterprise_linux/7/html/system_administrators.

Suggested equivalent online courses

- <https://www.classcentral.com/courses/linux-server-management-security-9319>
- <https://www.linuxlab.org>
- <https://www.redhat.com/sysadmin/prepare-certification-exam>
- https://linkedin.github.io/school-of-sre/linux-basics/linux_server_administration



ST. ALOYSIUS' COLLEGE JABALPUR (MADHYA PRADESH)

Autonomous, Reaccredited 'A++' Grade by NAAC (CGPA 3.58/4.00)

College with Potential for Excellence (CPE) by UGC

DST-FIST Supported & Star College Scheme by DBT

Affiliated to Rani Durgavati Vishwavidyalaya, Jabalpur (M.P.)

List of Practical

1. Installation of Linux Operating System
 - a. Download the Linux distribution of your choice
 - b. Boot into Live USB
 - c. Try out the Linux distribution before installing.
 - d. Start the installation process.
 - e. Create a username and password.
 - f. Set up the partition.
 - g. Start using Linux
2. 2.Introduction to basic Linux commands
 - a. To create a file, directory, copying a file, changing to a directory, moving, remove a file and directory, coming out of a directory, displaying the present working directory (cat cmd with Ip/Op redirections, mkdir, cp, mv, rm, cd, rmdir, cd ..., pwd)
 - b. Introduction to ls (Listing) and ls — l (Long Listing)
 - c. command and chmod (change mode of permissions) command with binary and symbolic masking.
 - d. Introduction to pipe command and grep command.
 - e. Use of vi editor with its modes.
3. File Structure
 - a. 1. Creation of Tree structure with respective directories & Subdirectories with files. File creation can be taught with cat>filename command as well as through VI editor.
 - b. Combining the files into new file & copying files from one location to another.
 - c. Removing files & directories with the help of rm and rmdir Command.
 - d. Changing permissions of files through the chmod command.
 - e. Displaying or filtering the files according to the requirement by using the grep command & combining the commands through the pipe command.
4. Permissions
 - a. User and Group Management: useradd, userdel, usermod, passwd, groupadd, groupdel, groupmod.
 - b. Understanding 3 Levels of Security: Owner of the object, Group that owns the object, Everyone else on the system
 - c. chmod command for Granting & Removing Permissions using binary masking method and symbolic masking method.
5. Server Administration:
 - a. Gaining super user access.
 - b. Installing and configuring firewall.



ST. ALOYSIUS' COLLEGE JABALPUR (MADHYA PRADESH)

Autonomous, Reaccredited 'A++' Grade by NAAC (CGPA 3.58/4.00)

College with Potential for Excellence (CPE) by UGC

DST-FIST Supported & Star College Scheme by DBT

Affiliated to Rani Durgavati Vishwavidyalaya, Jabalpur (M.P.)

- c. Configure FTP on the Linux Server. Transfer files to demonstrate the working of the same.
- d. Setting up Samba Server
- e. Configuring dhcp server and client
- f. Setting up the NFS File Server and transferring files to a Windows client
- g. Using gcc compiler (Programming using C)
- h. Using g++ compiler (Programming using C++)
- i. Using javac compiler
- j. Configuring Apache Web Server.

