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**उच्च शिक्षा विभाग**  
मध्य प्रदेश शासन

एन सी सी ए हेतु सहायक नं. 1800-180-5522

बी. सी. ए.

मुख्य कृष्ण / Dermo बी सी ए

बी. सी. ए. मुख्य विषय	गौण विषय	वैकल्पिक विषय
1. Computer Fundamentals, Organization and Architecture	1. Operating System	1. Computational Mathematics
2. Programming Methodology & Data Structures		2. Discrete Mathematics
		3. Numerical Methods
		4. Probability and Statistics

- व्यवसायिक विषय
- सहायक वैकल्पिक विषय
- विभागात्मक वैकल्पिक विषय
- कारिगरीय वैकल्पिक विषय
- अन्य वैकल्पिक विषय
- कला शाखा
- कारिगरीय शाखा
- विभागात्मक
- बी. सी. ए.

*Arde*  
21/8/2021

**BCA. शुरुवात विषय**

PART A: Introduction			
Programme Certificate	Class: B.C.A.	Year: 1 Year	Session: 2021-22
1. Course Code	SI-BCA1T		
2. Course Title	Computer Fundamentals, Organization and Architecture		
3. Course Type (Core/Elective/ Generic/ Vocational)	Major - Paper I		
4. Pre-Requisite (if any)	To study this course, a student must have basic knowledge of Computers.		
5. Course Learning Outcomes (CLO)	After the completion of this course, a successful student will be able to: <ul style="list-style-type: none"> <li>• Understand the basic structure, operation and characteristics of digital computer.</li> <li>• Design simple combinational digital circuits based on given parameters.</li> <li>• Understand the working of arithmetic and logic unit.</li> <li>• Know about hierarchical memory system including cache memories and virtual memory.</li> <li>• Know the contributions of Indians in the field of computer architecture and related technologies.</li> </ul>		
6. Credit Value	Theory - 4 Credits Practical - 2 Credits		
7. Total Marks	Max. Marks: 25+75	Min. Passing Marks: 33	

PART B: Content of the Course		
No. of Lectures (in hours per week): 2 Hrs. per week		
Total No. of Lectures: 60 Hrs.		
Module	Topics	No. of Lectures
1	Fundamentals of computers: Definition, Characteristics, capabilities and limitations. Types of Computers: Analog, Digital, Micro, Mini, Mainframe & Super Computers, Work Station, Server computers, Generations of Computers. Smart Systems: definition, characteristics and applications. Definition of Embedded system, GIS, GPS, Cloud Computing. Uses of computers in e-governance and various public domains and services.	8
2	Block diagram of computer and its functional units. Concept of hardware, software and firmware. Types of software. Input devices - keyboard, scanner, mouse, light pen, bar code reader, OMR, OCR, MICR, track ball, joystick, touch screen camera, mic etc. Output devices: monitors - classification of monitors based on technology -CRT & flat panel, LCD, LED monitors, speakers, printers - dot matrix printer, ink jet printer, laser printer, 3D Printers, Wi-Fi enabled printers, plotters and their types, LCD/LED projectors.	10

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PART A: Introduction		
Program: Certificate	Class: B.C.A	Year: 1 Year
Session: 2021-22		
1. Course Code	SI-BCAAIP	
2. Course Title	Computer Fundamentals and Digital Lab	
3. Course Type (Core Elective/ Generic Elective/ Vocational)	Major - Paper I	
4. Pre-Requisite (if any)	Open for All	
5. Course Learning Outcomes (CLO)	<p>After the completion of this course, a successful student will be able to do the following:</p> <ul style="list-style-type: none"> <li>Familiarity with parts of the computer and peripheral devices used with the computer.</li> <li>Realization of the basic logic and universal gates.</li> <li>Verify the behavior of logic gates using truth tables.</li> <li>Implement Binary-to -Gray, Gray-to -Binary code conversions.</li> <li>Design half and full adder circuit using basic gates.</li> <li>Design and construct flip flops and verify the excitation tables.</li> </ul>	
6. Credit Value	Practical - 2 Credits	
7. Total Marks	Max.Marks: 25*75	Min. Passing Marks: 33

PART B: Content of the Course		
No. of Lab. Practicals (in hours per week): 1 Hrs. per week		
Total No. of Labs: 30 Hrs.		
Suggestive list of Practicals		
	No. of Labs	
I. Computer Fundamentals	30 Hrs.	
a) Identify various parts of the computer by physical examination.		
b) Identify various parts inside the CPU like motherboard, SMPS, ports, buses, IC chips, Processor, HDD, RAM etc.		
c) Identify various I/O devices available in the lab physically.		
II. Digital Electronics		
a) Verification and interpretation of truth table for AND, OR, NOT gates		
b) Verification and interpretation of truth table for NAND, NOR gates		
c) Verification and interpretation of truth table for Ex-OR, Ex-NOR gates		
d) Study of half adder using XOR and NAND gates and verification of its operation		
e) Study of full adder using XOR and NAND gates and verification of its operation		

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f) Study of half subtractor and verification of its operation		
g) Study of full subtractor and verification of its operation		
h) Realization of logic functions with the help of NAND -Universal Gates		
i) Realization of logic functions with the help of NOR -Universal Gates		
j) Verify the truth table of JK flip-flops using NAND and NOR gates		
k) Verify the truth table of JK flip-flops using NAND and NOR gates		
l) Verify the truth table of T and D flip-flops using NAND and NOR gates		
m) Implementation of 4x1 multiplexer using logic gates		
n) Implementation of 1x4 demultiplexer using logic gates		
o) Verify Gray to Binary conversion using NAND gates only		
p) Verify Gray to Binary conversion using NAND gates only		

**PART C: Learning Resources**  
Textbooks, Reference Books, Other Resources

**Suggested Readings**

**Textbooks**

- M. Morris Mano, "Computer System Architecture", PHI
- Hearing Jordan, "Computer System Design & Architecture" (A.W.L.)
- मनमोहन सिन्हा अन्वयस्वी से प्रकल्पित विषय से संबंधित पुस्तकें।

**Reference Books:**

- William Stallings, "Computer Organization & Architecture", Pearson Education Asia.
- V. Carl Hamacher, "Computer Organization", TMH
- Tannenbaum, "Structured Computer Organization", PHI.

**Suggestive digital platform web links**

<https://de.in3labs.de/>

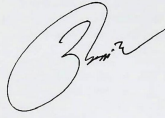
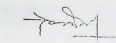
**Suggested equivalent online courses**

<https://nptel.ac.in/courses/109-105/105163/>



PART D: Assessment and Evaluation			
Internal Assessment: Continuous Comprehensive Evaluation (CCE) : 25 Marks		External Assessment: University Exam (UE): 75 Marks	
Time : 02.00 Hours			
Internal Assessment	Marks	External Assessment	Marks
Hands-on Lab-Practice	5 Marks	Practical record file	10 Marks
Viva	5 Marks	Viva voce practical	15 Marks
Lab Test from practical list	7 Marks	Table works/ Exercise Assigned (02) in practical exam	40 Marks

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Assignments (Charts/ Models/ Technology Dissemination/ Excursion/ Lab visit/ Industrial Training)	8 Marks	Reports of excursion/ Lab visits/ Industrial training/ Survey/ Collection/ Models	10 Marks
Total:	25 Marks	Total	75 Marks
Excursion/ Lab visits/ Industrial Training is compulsory			

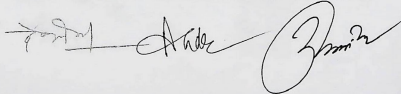

  
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PART A: Introduction	
Program: Certificate	Class: B.C.A.   Year: I Year   Session: 2021-22
1. Course Code	S1 - BCAA2T
2. Course Title	Programming Methodology & Data Structures
3. Course Type (Core Course/Elective/Generic/Elective/Vocational)	Major - Paper II
4. Prerequisite (if any)	To study this course, a student must have basic knowledge of Computers.
5. Course Learning Outcomes (CLO)	<p>After the completion of this course, a successful student will be able to do the following:</p> <ul style="list-style-type: none"> <li>Develop simple algorithms and flow charts to solve a problem with programming using top down design principles.</li> <li>Writing efficient and well-structured computer algorithms/programs.</li> <li>Learn to formulate iterative solutions and array processing algorithms for problems.</li> <li>Use recursive techniques, pointers and searching methods in programming.</li> <li>Will be familiar with fundamental data structures, their implementation become accustomed to the description of algorithms in both functional and procedural styles.</li> <li>Have knowledge of complexity of basic operations like insert, delete, search on these data structures.</li> <li>Possess ability to choose a data structure to suitably model any data used in computer applications.</li> <li>Assess efficiency tradeoffs among different data structure implementations.</li> <li>Implement and know the applications of algorithms for searching and sorting.</li> <li>Know the contributions of Indians in the field of programming and data structures.</li> </ul>
6. Credit Value	Theory - 4 Credits   Practical - 2 Credits
Total Marks	Max. Marks: 25+75   Min. Passing Marks: 33
PART B: Content of the Course	
No. of Lectures (in hours per week): 2 Hrs, per week	
Total No. of Lectures: 60 Hrs.	
Module	Topics   No. of Lectures
1	Introduction to Programming - Program Concept, Characteristics of Programming, Stages in Program Development, Algorithms, Notations, Design, Flowcharts, Types of Programming Methodologies.   8


  
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	<p><b>Basics of C++:</b> A Brief History of C++, Application of C++, Compiling &amp; Linking, Tokens, Keywords, Identifiers &amp; Constants, Basic Data Types, User-Defined Data Types, Symbolic Constant, Type Compatibility, Reference Variables, Operator in C++, Scope Resolution Operator, Member Dereferencing Operators, Memory Management Operators, Manipulators, Type Cast Operator.</p> <p><b>Functions in C++:</b> The Main Function, Function Prototyping, Call by Reference, Call by Address, Call by Value, Return by Reference, Inline Function, Default Arguments, Constant Arguments, Function Overloading, Function with Array.</p>	
II	<p><b>Classes &amp; Objects:</b> A Sample C++ Program with class, Defining Member Functions, Making an Outside Function Inline, Nesting of Member Functions, Private Member Functions, Arrays within a Class, Memory Allocation for Objects, Static Data Members, Static Member Functions, Array of Objects, Object as Function Arguments, Friend Functions, Virtual functions, Returning Objects, Constant member functions, Pointer to Members, Local Classes.</p> <p><b>Constructor &amp; Destructor:</b> Constructor, Parameterized Constructor, Multiple Constructors in a Class, Constructors with Default Arguments, Dynamic Initialization of Objects, Copy Constructor, Dynamic Constructor and Destructor.</p>	10
III	<p><b>Inheritance:</b> Defining Derived Classes, Single Inheritance, Making a Private Member Inheritable, Multilevel Inheritance, Hierarchical Inheritance, Multiple Inheritance, Hybrid Inheritance, Virtual Base Classes, Abstract Classes, Constructor in Derived Classes, Nesting of Classes, Operator Overloading &amp; Type Conversion, Polymorphism, Pointers, Pointers with Arrays C++, Streams, C++ Stream Classes, Unformatted I/O Operation, Formatted I/O Operation, Managing Output with Manipulators, Exception Handling.</p>	8
IV	<p><b>Data Structure:</b> Basic concepts, Linear and Non-Linear data structures</p> <p><b>Algorithm Specification:</b> Introduction, Recursive algorithms, Data Abstraction, Performance analysis.</p> <p><b>Arrays:</b> Representation of single, two-dimensional arrays, triangular arrays, sparse matrices-array and linked representations.</p> <p><b>Stacks:</b> Operations, Array and Linked Implementations, Applications- Infix to Postfix Conversion, Infix to Prefix Conversion, Postfix Expression Evaluation, Recursion Implementation.</p> <p><b>Queues:</b> Definition, Operations, Array and Linked Implementations, Circular Queue-Insertion and Deletion Operations, Dequeue (Double Linked Queue), Priority Queue-Implementation.</p>	12
V	<p><b>Linked Lists:</b> Singly Linked Lists, Operations, Concatenating, circularly linked lists-Operations for Circularly linked lists, Doubly Linked Lists- Operations, Doubly Circular Linked List, Header Linked List.</p> <p><b>Trees:</b> Representation of Trees, Binary tree, Properties of Binary Trees, Binary Tree Representations- Array and Linked Representations.</p>	10



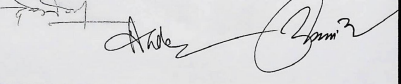
VI	<p><b>Binary Tree Traversals, Threaded Binary Trees</b></p> <p><b>Heap: Definition, Insertion, Deletion.</b></p> <p><b>Graphs:</b> Graph ADT, Graph Representations, Graph Traversals, Searching.</p> <p><b>Hashing:</b> Introduction, Hash tables, Hash functions, Overflow Handling.</p> <p><b>Sorting:</b> Bubble Sort, Selection Sort, Insertion Sort, Quick Sort, Merge Sort, Comparison of Sorting Methods.</p> <p><b>Search Trees:</b> Binary Search Trees, AVL Trees- Definition and Examples.</p>	10
VII	<p><b>Indian Contribution to the field:</b> Innovations in India, origin of Julia Programming Language, Indian Engineers who designed new programming languages, open source languages, Dr. Sauraj Sahni - computer scientist - pioneer of data structures, Other relevant contributions and contributions.</p>	2

**PART C: Learning Resources**

- Textbooks, Reference Books, Other Resources**
- Suggested Readings**
- Textbooks:**
- J. R. Hanly and E. D. Evlinan, "Problem Solving and Program Design in C", Pearson, 2015
  - E. R. Horowitz, "C++", TMH Publication ISBN 0-07-462038-X
  - Harshvardhan, "C++ The Complete Reference", TMH Publication ISBN 0-07-465880-7
- Reference Books:**
- R. Lamm, "Object Oriented Programming C++"
  - N. Dale and C. Weems, "Programming and problem solving with C++: brief edition", Jones & Bartlett Learning.
  - Allen Brooks, "Data Structures and algorithm in C++", Third Edition, Cengage Learning.
  - Sauraj Sahni, "Data Structures, Algorithms and Applications with C++", McGraw Hill.
  - Robert L. Kruse, "Data Structures and Program Design in C++", Pearson.
  - D.S. Malik, "Data Structure using C++", Second edition, Cengage Learning.
  - M. A. Weiss, "Data structures and Algorithm Analysis in C", 2nd edition, Pearson.
  - L. J. Layman, "Schaum's outline series Data structures", Tata McGraw-Hill.
- Suggested digital platform web links**
- <https://www.youtube.com/watch?v=HCS4lyzssA>
  - <https://www.youtube.com/watch?v=1PwXZiW4Yv1eag>
  - <https://www.youtube.com/watch?v=Umm1Lz39iLzw>
- Suggested equivalent online courses**
- | S. No. | Online Course   | Duration   | Platform |
|--------|---|------------|----------|
| 1      | Programming in C++<br><a href="https://www.coursera.org/learn/cplusplus">https://www.coursera.org/learn/cplusplus</a>   | 8 weeks    | NPTEL    |
| 2      | Learning C++ Programming - From Beginner to Beyond<br><a href="https://www.udacity.com/course/learn-cplusplus">https://www.udacity.com/course/learn-cplusplus</a> | Self paced | Udemy    |

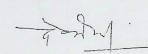
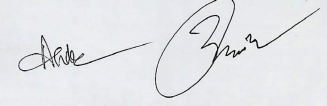
**PART D: Assessment and Evaluation**

Internal Assessment: Continuous External Assessment: University Exam (UE): 75

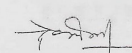
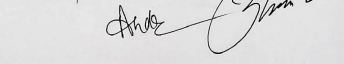


Comprehensive Evaluation (CCE) : 25 Marks		Marks	
Should be based on allotted assignments and Class Tests. The marks shall be as follows:		Time : 02.00 Hours	
Assignment and Presentation of	8 Marks	Section (A) : Three Very Short Questions (50 Words Each) OR Nine MCQ Questions	03 x 03 = 09 Marks
Class Test I (Objective Questions)	4 Marks		
Class Test II (Descriptive Questions)	5 Marks	Section (B) : Four Short Questions (200 Words Each)	04 x 09 = 36 Marks
Class Test III (Based on solving programming problems)	8 Marks	Section (C) : Two Long Questions (500 Words Each)	02 x 15 = 30 Marks
<b>Total</b>	<b>25 Marks</b>	<b>Total</b>	<b>75 Marks</b>

Suggestion: Focus of the course/teaching should be on developing ability of the student in analyzing a problem, building the logic and efficient code for the problem.

PART A: Introduction			
Program Certificate	Class: B.C.A.	Year: 1 Year	Session: 2021-22
1. Course Code	S1 - BCAA2P		
2. Course Title	Programming Methodology & Data Structures Lab		
3. Course Type (Core course, Elective, Vocational)	Major - Paper II		
4. Pre-Requirement (if any)	To study this course, a student must have basic knowledge of Computers.		
5. Course Learning Outcomes (CLO)	<p>After the completion of this course, a successful student will be able to do the following:</p> <ol style="list-style-type: none"> <li>Develop simple algorithms and flow charts to solve a problem with programming using top down design principles.</li> <li>Writing efficient and well-structured computer algorithms/programs.</li> <li>Learn to formulate iterative solutions and array processing algorithms for problems.</li> <li>Use recursive techniques, pointers and searching methods in programming.</li> <li>Possess ability to choose a data structure to suitably model any data used in computer applications.</li> <li>Implement and know the applications of algorithms for searching and sorting etc.</li> </ol>		
6. Credit Value	Practical - 2 Credits		
7. Total Marks	Max. Marks: 25*75	Min. Passing Marks: 33	
<b>PART B: Content of the Course</b>			
No. of Lab Practicals (in hours per week): <b>1 hour per week</b>			
Total No. of Lab: 30 Hrs.			
Suggestive list of Practicals:			No. of Labs:
<p>Given the problem statement, students are required to formulate problem, develop flow chart/algorithm, write code in C++, execute and test it. Students should be given assignments on following:</p> <ol style="list-style-type: none"> <li>Write a program to swap the contents of two variables.</li> <li>Write a program for finding the roots of a Quadratic Equation.</li> <li>Write a program to find area of a circle, rectangle, square using switch case.</li> <li>Write a program to print table of any number.</li> <li>Write a program to print Fibonacci series.</li> <li>Write a program to find factorial of a given number using recursion.</li> <li>Write a program to convert decimal (integer) number into</li> </ol>			30

- equivalent binary 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 print sum of two matrices.
  11. Write a program to print multiplication of two matrices.
  12. Write a program to generate even/odd series from 1 to 100.
  13. Write a program whether a given number is prime or not.
  14. Write a program for call by value and call by reference.
  15. Write a program to create a pyramid structure
 

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1
12
123
1234

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  16. Write a program to check entered number is Armstrong or not.
  17. Write a program to input N numbers and find their average.
  18. Write a program to find the area and volume of a rectangular box using constructor.
  19. Write a program to design a class time with hours, minutes and seconds as data members. Use a data function to perform the addition of two time objects in hours, minutes and seconds.
  20. Write a program to implement single inheritance.
  21. Write a program to find largest element from an array.
  22. Write a program to implement push and pop operations on a stack using array.
  23. Write a program to perform insert and delete operations on a queue using array.
  24. Write a program for Linear search.
  25. Write a program for Binary search.
  26. Write a program for Bubble sort.
  27. Write a program for Selection sort.
  28. Write a program for Quick sort.
  29. Write a program for Insertion sort.
  30. Write a program to implement linked list.

**PART C: Learning Resources**

Textbooks, Reference Books, Other Resources

**Suggested Reading:**

- J. R. Hardy and E. B. Koffman, "Problem Solving and Program Design in C", Pearson, 2015
- B. Balagurusamy, "C++", TMH Publication ISBN 0-07-462038-X
- Herbert Schildt, "C++ The Complete Reference" TMH Publication ISBN 0-07-463880-7
- [www.cplusplus.com/](http://www.cplusplus.com/) (for C++ reference)

**Reference Books:**

- M. Latafa, "Object Oriented Programming C++"
- S. Dile and C. Weems, "Programming and problem solving with C++ (brief edition)", Jones & Bartlett

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- Anand Dey, "Data Structures and algorithm in C++", Third Edition, Cengage Learning.
- Sumit Saha, "Data Structures, Algorithms and Applications with C++", McGraw Hill.
- Robert I. Taylor, "Data Structures and Program Design in C++", Pearson.
- S. S. Malik, "Data Structure using C++", Second edition, Cengage Learning.
- M. A. Weiss, "Data structures and Algorithm Analysis in C", 3rd edition, Pearson.
- A. S. Tanenbaum, "Schaum's outline series Data structures", Tata McGraw-Hill
- [www.cplusplus.com/search?query=BCIS402&query=BCIS402&query=UINPWS20W&query=UINPWS20W&query=UINPWS20W&query=UINPWS20W](http://www.cplusplus.com/search?query=BCIS402&query=BCIS402&query=UINPWS20W&query=UINPWS20W&query=UINPWS20W&query=UINPWS20W)
- [www.cplusplus.com/search?query=UINPWS20W&query=UINPWS20W&query=UINPWS20W&query=UINPWS20W](http://www.cplusplus.com/search?query=UINPWS20W&query=UINPWS20W&query=UINPWS20W&query=UINPWS20W)
- [www.cplusplus.com/search?query=UINPWS20W&query=UINPWS20W&query=UINPWS20W&query=UINPWS20W](http://www.cplusplus.com/search?query=UINPWS20W&query=UINPWS20W&query=UINPWS20W&query=UINPWS20W)

Sl. No.	Online Course	Duration	Platform
1	Programming in C++ <a href="https://nptel.iitk.ac.in/courses/1162/105/106/105151/">https://nptel.iitk.ac.in/courses/1162/105/106/105151/</a>	8 weeks	NPTEL
2	Beginning C++ Programming - From Beginner to Beyond <a href="https://www.udacity.com/course/beginning-cplusplus-programming">https://www.udacity.com/course/beginning-cplusplus-programming</a>	Self paced	Udemy

**PART D: Assessment and Evaluation**

Internal Assessment : Continuous Comprehensive Evaluation (CCE) : 25 Marks		External Assessment: University Exam (UE) : 75 Marks	
Internal Assessment	Marks	External Assessment	Marks
Homework/Lab Practice	5 Marks	Practical record file	10 Marks
Quiz	5 Marks	Viva voce practical	15 Marks
Lab Test from industrial visit	7 Marks	Table works/ Exercise Assigned (02) in practical exam	40 Marks
Classroom assessment (short) Model Technology Demonstration/ Presentation/ Lab visit/ Industrial training	8 Marks	Reports of excursion/ Lab visits/ Industrial training/ Survey/ Collection/ Models	10 Marks
<b>Total</b>	<b>25 Marks</b>	<b>Total</b>	<b>75 Marks</b>

*[Handwritten notes: "Total Excursion/ Lab visits/ Industrial Training is compulsory"]*

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B.C.A

गौतम विद्यापीठ

PART A: Introduction			
Program	Certificate	Class: B.C.A.	Year: I Year Session: 2021-22
1	Course Code	SI - BCAB2T	
2	Course Title	Operating System	
3	Course Type (Core/Elective/Vocational)	Minor	
4	Pre-Requisite (if any)	Open for all	
5	Course Learning Outcomes (CLO)	<ul style="list-style-type: none"> <li>After the completion of this course, a student shall be able to do the following:               <ul style="list-style-type: none"> <li>Describe the importance of computer system resources and the role of operating system in their management policies and algorithms.</li> <li>Specify objectives of modern operating systems and describe how operating systems have evolved over time.</li> <li>Understand various process management concepts and can compare various scheduling techniques, synchronization, and deadlocks.</li> <li>Describe the concepts of memory management techniques.</li> <li>Identify the best suited process management technique for any process.</li> <li>Describe various file operations, file allocation methods and disk space management.</li> <li>To understand and identify potential threats to operating systems and the security features to guard against them.</li> <li>Learn to operate the Linux system.</li> </ul> </li> </ul>	
6	Credit Value	Theory - 4 Credits Practical - 2 Credits	
7	Total Marks	Max. Marks: 25+75   Min. Passing Marks: 33	

PART B: Content of the Course

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

Total No. of Lectures: 60 Hrs.

Module	Topics	No. of Lectures
I	Introduction to Operating System: What is Operating System? History and Evolution of OS, Basic OS functions, Resource Abstraction, Types of Operating Systems- Batch Systems, Multiprogramming Systems, Multiprocessing Systems, Time Sharing Systems, Distributed OS, Real time systems Operating System for Personal Computers, Workstations and Hand-held Devices. Applications of various operating system in real world. Some prevalent operating systems - Windows, UNIX/Linux, Android, MacOS, Blackberry OS, Symbian, Bada etc.	6
II	Process Management: Process Concepts, Process states & Process Control Block. Process Scheduling: Scheduling Criteria, Scheduling Algorithms (Preemptive & Non-Preemptive) - FCFS, SJF, SRTN, RR, Priority.	14

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III	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.	14
IV	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), Directory Structure (Single-Level, Two-Level, Tree-Structured, Acyclic-Graph, General Graph), Allocation Methods (Contiguous, Linked, Indexed)	12
V	Disk Management: Structure, Disk Scheduling Algorithms (FCFS, SSTF, SCAN, C-SCAN, LOOK), Swap Space Management, Disk Reliability, Recovery Security: Security Threats, Security policy mechanism, Protection, Trained Systems, Authentication and Internal Access Authorization, Windows Security	12
VI	LINUX: Introduction, History and features of Linux, advantages, hardware requirements for installation, Linux architecture, file system of Linux - boot block, super block, inode table, data blocks. Linux standard directories, Linux kernel, Partitioning the hard drive for Linux, installing the Linux system, system - startup and shut-down process, init and run levels, Process, Swap, Partition, fdisk, checking disk free spaces. Difference between CLI OS & GUI OS, Windows vis Linux, Importance of Linux Kernel, Files and Directories. Concept of Open Source Software. Indian contribution to the field - the BOSS operating system, open source softwares, growth of LINUX, Aryabhata Linux, contributions of innovators - RatanSheth, Sunder Pichai etc.	2

PART C: Learning Resources

Textbooks, Reference Books, Other Resources

Suggested Readings

Textbooks:

- A Silberschatz, P.B Galvin, G. Gagne, Operating Systems Concepts, 8th Edition, John Wiley Publications.
- A.S. Tanenbaum, Modern Operating Systems, 3rd Edition, Pearson Education.
- Operating System by Peterson
- Linux by Sumitabh Das
- म.भा.प.दे.प्र.डि.प्र.का.अ.अ.व.स.मि.प्र.का.सि.सि.वि.प.स.स.व.वि.पु.स.सि.

Reference Books:

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

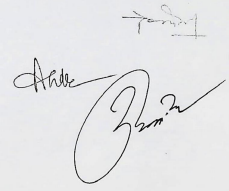
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Suggestive digital platform web links  
<https://web.itb.ac.in/~mmit/MT1458.html>  
<https://www.esetb.ac.in/~mmit/blo>  
<https://www.youtube.com/watch?v=cJ3Ygoolf1Q>  
 Suggestive equivalent online courses  
<https://itb.ac.in/course/106/10610713/>

PART D: Assessment and Evaluation			
Internal Assessment - Continuous Comprehensive Evaluation (CCE) - 25 Marks Should be based on allotted assignments and Class Tests. The marks shall be as follows:	External Assessment: University Exam (UE) : 75 Marks Time : 02.00 Hours		
Assessment and presentation of assignment	4 Marks	Section (A) : Three Very Short Questions (50 Words Each)	03 x 03 = 09 Marks <b>OR</b> 09 x 01 = 9 Marks
Class Test I (Objective Questions)	5 Marks	OR Nine MCQ Questions	
Class Test II (Descriptive Questions)	8 Marks	Section (B) : Four Short Questions (200 Words Each)	04 x 09 = 36 Marks
Class Test III (Based on OS commands)	8 Marks	Section (C) : Two Long Questions (500 Words Each)	02 x 15 = 30 Marks
Total	25 Marks	Total	75 Marks

Any remarks/suggestion:

  
 Anil Kumar

PART A: Introduction			
Program: Certificate	Class: B.C.A.	Year: 1 Year	Session: 2021-22
1. Course Code	S1-BCAB2P		
2. Course Title	Operating System Lab		
3. Course Type (Core Course/Elective/Generic Elective/Vocational)	Minor		
4. Pre-Requisite (if any)	Open for All		
5. Course Learning Outcomes (CLO)	After the completion of this course, a student shall be able to: <ul style="list-style-type: none"> <li>• Operate the Linux system.</li> <li>• Do administration</li> <li>• Use Vi Editor</li> </ul>		
6. Credit Value	Practical - 2 Credits		
7. Total Marks	Max. Marks: 25+75	Min. Passing Marks: 33	

**PART B: Content of the Course**

No. of Lab Practicals (in hours per week): 1HR, per week  
 Total No. of Labs: 30 Hrs.

Suggestive List of Practicals	No. of Labs.
Linux: a) Linux Directory Commands: pwd, mkdir, rm -rf, ls, cd, cd /, cd -, rename b) Linux File Commands: touch, cat, cat >, cat >>, mv, cp, mv, rename c) Linux Permission Commands: su, id, useradd, passwd, groupadd, chmod, groupdel, chown, chgrp d) Linux File Content & Filter Commands: head, tail, tac, more, less, grep, cat, cut, grep, comm, sed, tee, tr, uniq, wc, cut, sort, diff e) Linux Utility Commands: find, be, locate, date, cal, sleep, time, df, mount, exit, clear, gzip, gunzip f) Linux Networking Commands: ip, ssh, mail, ping, host g) Edit Cronjob file, to mail message on system on particular time automatically. h) Vi editor: Create file, edit, save and quit. Highlighting the searched term within a file, cut, yank, undo.	30

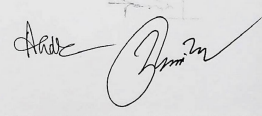
**PART C: Learning Resources**

Suggested Readings  
 Textbooks, Reference Books, Other Resources

**Textbooks:**

- Linux by Sumitabh Das
- Linux Bible
- मैक्रॉसॉफ्ट ऑपरेटिंग सिस्टम में प्रयुक्त सिस्टम प्रशासन

Suggestive digital platform web links  
<https://web.itb.ac.in/~mmit/MT1458.html>  
<https://www.esetb.ac.in/~mmit/blo>  
<https://www.youtube.com/watch?v=cJ3Ygoolf1Q>

  
 Anil Kumar

Suggested equivalent online courses  
 (http://npTEL.ac.in/courses/106/102/106102132)  
 (https://www.youtube.com/watch?v=01KWN1N9qCc)

PART D: Assessment and Evaluation			
Internal Assessment - Continuous Comprehensive Evaluation (CCE) - 25 Marks		External Assessment: University Exam (UE) - 75 Marks Time - 02.00 Hours	
Internal Assessment	Marks	External Assessment	Marks
Hands-on Lab Practice	5 Marks	Practical record file	10 Marks
Viva	5 Marks	Viva voce practical	15 Marks
Lab Test from practical list	7 Marks	Table works/ Exercise Assigned (02) in practical exam	40 Marks
Assignments (Charts Model/ Technology Dissemination/ Excursion/ Lab visit/ Industrial Training)	8 Marks	Reports of excursion/ Lab visits/ Industrial training/ Survey/ Collection/ Models	10 Marks
<b>Total</b>	<b>25 Marks</b>	<b>Total</b>	<b>75 Marks</b>
<i>Excursion/ Lab visits/ Industrial Training is compulsory</i>			

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BCA विभाग द्वारा

Program: Certificate			
PART A: Introduction			
Class: BCA	Year: I Year	Session: 2021-22	
1. Course Code	S1-BCACL9		
2. Course Title	Computational Mathematics		
3. Course Type (Core Elective/Generic Elective/Vocational)	Elective		
4. Pre-Requisite (if any)	Students must have basic analytical aptitude.		
5. Course Learning Outcomes (CLO)	On successful completion of the course the students shall be able to: 1. Implement trigonometric solutions for measurements in real world scenarios 2. Implement matrices and simultaneous equations to solve complex problems 3. Use statistical tools efficiently 4. Use Mathematical Logic and predicate calculus for solving problems 5. Apply the concepts of set theory for finding solutions to set related problems.		
6. Credit Value	Theory - 6 Credits		
7. Term Marks	Max. Marks: 25+75	Min. Passing Marks: 33	
PART B: Content of the Course			
No. of Lectures (in hours per week): 3 Lectures Per week			
Total No. of Lectures: 90 Hrs.			
Unit	Topics	No. of Lectures	
I	Trigonometry: Angles & their Measurement, Values of Trigonometric Ratios, Height and Distances, Elementary Matrices and types of matrices	18	
II	Equations: Simultaneous linear equations, Methods of Solving Simultaneous equations, Quadratic equations.	18	
III	Statistics: Frequency Distribution, Measure of Central Tendency: Mean, Mode, Median Measures of variation: Mean deviation Standard Deviation,	18	
IV	Mathematical Logic: Statements and notations, Connectives: Negation, Conjunction, And Disjunction, Statement formulas and truth tables, tautologies, Tautological implications, contradiction contingency	18	
V	Set Theory: Basic concepts of set theory, notation, inclusion and equality of sets, the power set, types of sets, operations on set, Venn diagrams.	18	

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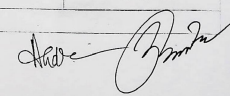
**PART C: Learning Resources**  
Textbooks, Reference Books, Other Resources

- Recommended Readings:**
- Text Books:**
1. Business Mathematics S.M.SHUKLA, Sahitya Bhawan Publications.
  2. Business Mathematics D C Agrawal, Sree Sai Prakasham.
  3. B. Sarkar, A Text Book of Discrete Mathematics, S Chand, 2005.
  4. Discrete Mathematics 9/E - Sarkar S K, S.Chand New Delhi, 2016
- Reference Books:**
1. Fundamentals of Statistics F.HANCE & F.HANCE, Kitab Mahal Publication.
  2. Mathematical Statistics, S.E. RAY and SHARMA, Ram Prasad and Sons.
  3. Business Mathematics, J.K. Singh, Himalaya Publishing House 2017
  4. Discrete Mathematics, P.E. Sancheli and Kapoor, Sultan Chand & Sons, 2014
  5. Discrete Mathematics structures with application to computer science, Indian Edition, J. P. Tremblay, R Manohar, McGraw hill Education, 2017
  6. Discrete Mathematical 2/E, J.K. Sharma, Macmillan publication, 2005
- Suggested digital platform web links**
- https://www.lectures.com/university/it-rookie/  
 https://www.highereducation.rup.gov.in/?page=zhzQnpZwkyRqeZlv%2fy5G7w%43D%3D  
 https://www.aicte.ac.in/
- Suggested equivalent online courses**
- | Sl.No. | Course Title             | Duration | Provider           |
|--------|--------------------------|----------|--------------------|
| 1      | Algebra and Trigonometry | 15 weeks | Swayam             |
| 2      | Mathematics              | 8 weeks  | Mitopun Courseware |
- Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]**

**PART D: Assessment and Evaluation**

Internal Assessment: Continuous Comprehensive Evaluation (CCE) : 25 Marks		External Assessment: University Exam (UE) : 75 Marks	
Should be based on allotted assignments and class tests. The marks shall be as follows:		Time : 02.00 Hours	
Assessment and presentation of assignment	4 Marks	Section (A) : Three Very Short Questions (50 Words Each) OR Nine MCQ Questions	03 x 03 = 09 Marks <b>OR</b> 09 x 01 = 9 Marks
Class Test I (Objective Questions)	5 Marks		
Class Test II (Descriptive Questions)	8 Marks	Section (B) : Four Short Questions (200 Words Each)	04 x 09 = 36 Marks
Class Test III (Objective and Descriptive questions)	8 Marks	Section (C) : Two Long Questions (500 Words Each)	02 x 15 = 30 Marks
<b>Total</b>	<b>25 Marks</b>	<b>Total</b>	<b>75 Marks</b>

Write marks suggestions:



**Part A Introduction**

Program/Certificate Course	Class:BCA I Year	Year: 2021	Session: 2021-2022
1. Course Code	S1 - BCAA20		
2. Course Title	Discrete Mathematics		
3. Course Type	Elective		
4. Pre-requisite (if any)	Open for All		
5. Course Learning Outcomes (CLO)	The course will enable the students: 1. Apply the Boolean algebra, switching circuits and their applications. 2. Minimize the Boolean Function using Karnaugh Map. 3. Understand the lattices and their types. 4. Graphs, their types and its applications in study of shortest path algorithms. 5. Test whether two given graphs are isomorphic. 6. Understand the Eulerian and Hamiltonian graphs. 7. Represent graphs using adjacency and incidence matrices. 8. Understand the discrete numeric functions, generating functions and Recurrence Relations.		
6. Credit Value	Theory:6	Credit	
7. Total Marks	Max. Marks : 25		Min. Passing Marks: 33

**Part B - Content of the Course**

Total No. of Lectures (in hours per week): 3 hours per week Total Lectures: 90 hours		
Unit	Topics	No. of Lectures
I	Relations: Binary, Inverse, Composite and Equivalence relation, Equivalence classes and its properties, Partition of a set, Partial order relation, Partially ordered and Totally ordered sets, Hasse diagram. Lattices: Definition and examples, Dual, bounded, distributive and complemented lattices.	18
II	Boolean Algebra: Definition and properties, Switching circuits and its applications, Logic gates and circuits Boolean functions: Disjunctive and conjunctive normal forms, Bool's expansion theorem, Minimize the Boolean function using Karnaugh Map.	18
III	Graphs: Definition and types of graphs, Subgraphs, Walk, path and circuit, Connected and disconnected graphs, Euler graph, Hamiltonian path and circuit, Dijkstra's Algorithm for shortest paths in weighted graph.	18



IV	<b>Trees:</b> Definition and its properties, Rooted, Binary and Spanning tree Rank and nullity of a graph, Kruskal's and Prim's Algorithm, Cut-set and its properties, Fundamental Circuit and Cut-Set, Planar graphs. <b>Matrix representation of graphs:</b> Incidence, Adjacency, Circuit, Cut-Set, Path.	18
V	<b>Discrete numeric and generating functions:</b> Operations on numeric functions, Asymptotic behavior of numeric functions, Generating functions. <b>Recurrence relations and recursive algorithms:</b> Recurrence relations, Linear recurrence relations with constant coefficients, Homogeneous solutions, Particular solutions, Total solutions, Solution by the method of generating functions.	18

**Keywords/Tags:** Relation, Hasse diagram, Lattices, Boolean Algebra, Boolean function, Graph and Subgraph, Path and circuit, Tree, Spanning tree, Cut-set, Matrix representation of graph, Discrete numeric function, Generating function, Recurrence relation, Recursive algorithm.

**Part C – Learning Resources**  
Text Books, Reference Books, Other Resources

**Suggested Readings:**

**Text Books:**

1. J. P. Tremblay and R. Manohar, Discrete Mathematical Structures With Applications To Computer Science, McGraw Hill Education, 1st edition, 2017.
2. C. L. Liu, Elements of Discrete Mathematics, McGraw Hill Education, 4th edition, 2017.
3. Narasingh Deo: Graph Theory with Applications to Engineering and Computer Science, Prentice Hall India Learning Private Limited, 1979.
4. नारायण देवो जी द्वारा लिखित ग्राफ थियरी में संक्षिप्त व्याख्यान

**Reference Books:**

1. Seymour Lipschutz and Mark Lipson: Discrete Mathematics (Schaums Outline), McGraw Hill Education, 3rd edition, 2017.
2. Edgar G. Goodaire and Michael M. Parmenter, Discrete Mathematics with Graph Theory, Pearson Education Pt. Ltd., Indian Reprint 2003.

**Suggested Digital Platforms Web links:**

<https://www.highereducation.mpg.gov.in/?page=xbzIQmpZwlylQo2b%2Fy5G7w%3D%3D>

**Suggested Equivalent online courses:**

<https://nptel.ac.in/courses/111106086>

<https://ugcnoocs.in/libnet.ac.in/index.php/courses/view Ug311>

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Part D: Assessment and Evaluation		
<b>Suggested Continuous Evaluation Methods:</b>		
Maximum Marks:	100	
Continuous Comprehensive Evaluation (CCE):	25Marks	
University Exam (UE):	75Marks	
<b>Internal Assessment:</b>	Class Test	15
Continuous	Assignment/Presentation	10
Comprehensive Evaluation (CCE):		<b>Total Marks: 25</b>
<b>External Assessment:</b>	Section (A): Three Very Short Questions (50 Words Each)	03 × 03 = 09
University Exam (UE)	Section (B): Four Short Questions (200 Words Each)	04 × 09 = 36
Time: 02:00 Hours	Section (C): Two Long Questions (500 Words Each)	02 × 15 = 30
		<b>Total Marks: 75</b>

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Part A Introduction		
Program/Certificate Course	Class: BCA I Year	Year: 2021   Session: 2021-2022
1. Course Code	SI - B.C.A.1.6	
2. Course Title	Numerical Methods	
3. Course Type	Elective	
4. Pre-requisite (if any)	Open for All	
5. Course Learning Outcomes (CLO)	The course will enable the students to: 1. Understand numerical methods to find the solution of a system of linear equations. 2. Compute interpolation value for real data. 3. Find quadratic by using various numerical methods. 4. Solve system of linear equations by using various numerical techniques. 5. Obtain solutions of ordinary differential equations by using numerical methods.	
6. Credit Value	Theory: 03 Credit	
7. Total Marks	Max. Marks: 25 + 75   Min. Passing Marks: 33	

Part B - Content of the Course		
Total No. of Lectures (in hours per week): 3 hours per week		
Total Lectures: 90 hours		
Unit	Topics	No. of Lectures
I	Methods for Solving Algebraic and Transcendental Equations: Bisection Method, RegulaFalsi Method, Secant Method, Newton-Raphson Method, Ramanujan Method.	18
II	Interpolation: Lagrange interpolation, Finite difference operators, Interpolation formula using Differences, Gregory-Newton Forward Difference Interpolation, Gregory-Newton Backward Difference Interpolation.	18
III	Numerical Integration: Newton-Cote's formulae, Trapezoidal rule, Simpson's 1/3 rule, Simpson's 3/8 rule, Gauss Integration.	12
IV	Methods to Solve System of Linear Equations: Direct method for solving system of linear equations: Gauss elimination, LU decomposition, Cholesky decomposition, iterative method: Jacobi, Gauss-Seidel.	21
V	Numerical Solution of Ordinary Differential Equations: Single step methods: Picard, Taylor's series, Euler, Runge-Kutta. Multistep methods: Predictor-corrector, Modified Euler, Milne-Simpson.	21

Keywords/Tags:  
Algebraic and transcendental equations, Interpolation, Numerical Integration, Gauss elimination method, LU decomposition, Jacobi method, Gauss-Seidel method, Picard method, Runge-Kutta method, Predictor-corrector method, Milne-Simpson method.  
Remark: Scientific calculator will be allowed during examination.

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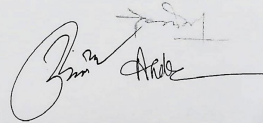
Part C - Learning Resources	
Text Books, Reference Books, Other Resources	
<b>Suggested Readings:</b>	
<b>Text Books:</b>	
1. S. S. Sastry: Introductory Methods of Numerical Analysis, Prentice Hall India Learning Private Limited, Fifth edition, 2012.	
2. E. Balagurusamy: Numerical Methods, Tata McGraw Hill Publication, 2017.	
3. मूल गणित विषय के अध्यायों से प्रकटित विषय से संबंधित पुस्तकें	
<b>Reference Books:</b>	
1. M. K. Jain, S. R. K. Ingar, R. K. Jain, Numerical Method for Scientific and Engineering Computation, New Age International (P) Ltd., 1999.	
2. Saxena H. C.: Finite Differences & Numerical Analysis, S Chand, 2010.	
<b>Suggested Digital Platforms Web links:</b>	
<a href="https://epgp.inlibnet.ac.in">https://epgp.inlibnet.ac.in</a>	
<a href="https://www.highereducation.mp.gov.in/?page=shzQmpZwkyIQo2h%2Fy5G7w%3D%3D">https://www.highereducation.mp.gov.in/?page=shzQmpZwkyIQo2h%2Fy5G7w%3D%3D</a>	
<b>Suggested Equivalent online courses:</b>	
<a href="https://nptel.ac.in/courses/111106101">https://nptel.ac.in/courses/111106101/</a>	
<a href="https://nptel.ac.in/courses/111107105/">https://nptel.ac.in/courses/111107105/</a>	
<a href="https://nptel.ac.in/courses/111107107/">https://nptel.ac.in/courses/111107107/</a>	
<a href="https://uemooos.inlibnet.ac.in/index.php/courses/view_pg/1476">https://uemooos.inlibnet.ac.in/index.php/courses/view_pg/1476</a>	

Part D: Assessment and Evaluation		
<b>Suggested Continuous Evaluation Methods:</b>		
Maximum Marks: 100		
Continuous Comprehensive Evaluation (CCE): 25Marks		
University Exam (UE): 75Marks		
<b>Internal Assessment:</b>	Class Test	15
Continuous Comprehensive Evaluation (CCE)	Assignment-Presentation	10
	<b>Total Marks: 25</b>	
<b>External Assessment:</b>	Section (A): Three Very Short Questions (50 Words Each)	03 × 03 = 09
University Exam (UE)	Section (B): Four Short Questions (200 Words Each)	04 × 09 = 36
Time: 02.00 Hours	Section (C): Two Long Questions (800 Words Each)	02 × 15 = 30
	<b>Total Marks: 75</b>	

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Part A Introduction			
Program/Certificate Course	Class: BCA I Year	Year: 2021	Session: 2021-2022
1. Course Code	S1-BCA P-2-G		
2. Course Title	Probability and Statistics		
3. Course Type	Elective		
4. Pre-requisite (if any)	Open for All		
5. Course Learning Outcomes (CLO)	This course will enable the students to: <ol style="list-style-type: none"> <li>1. Describe and calculate the mean deviation, standard deviation, range, quartiles and percentiles.</li> <li>2. Understand and use the terminology of probability.</li> <li>3. Determine whether two events are mutually exclusive and independent.</li> <li>4. Calculate probabilities using the addition and multiplication rules.</li> <li>5. Recognize and understand discrete and continuous probability distribution functions, binomial, uniform and exponential probability distribution.</li> <li>6. Calculate and interpret the correlation coefficient.</li> <li>7. Understand the basic concepts of linear regression and correlation.</li> <li>8. Interpret the Student's t probability distribution, chi-square goodness-of-fit, F and Z test.</li> </ol>		
6. Credit Value	Theory: 6 Credit		
7. Total Marks	Max. Marks: 25 + 75   Min. Passing Marks:		

Part B - Content of the Course		
Total No. of Lectures (in hours per week): 3 hours per week		
Total Lectures: 90 hours		
Unit	Topics	No. of Lectures
I	Theory of Probability - I: Event and Sample space, Probability of an event, Addition and multiplication theorem of probability, Inverse probability, Baye's theorem. Continuous probability.	18
II	Theory of Probability - II: Probability density function and its applications, Standard deviation of various continuous probability distributions, Mathematical expectation, Expectation of sum and product of random variables.	18
III	Dispersion and Distribution: Measures of dispersion: Range and interquartile range, Mean deviation and Standard deviation, Moments, Skewness and kurtosis. Moment generating function. Theoretical distribution: Binomial, Poisson, Rectangular, Exponential.	18

  
 J. M. Arde

IV	Curve fitting and Correlation: Methods of least squares, Curve fitting, Correlation and regression, Partial and multiple correlations (up to three variables only)	18
V	Sampling: Sampling of large samples, Null and alternative hypothesis, Errors of first and second kinds, Level of significance and critical region, Tests of significance based on chi-square ( $\chi^2$ ), t, F and Z distribution.	18

Keywords/Tags:  
Probability, Dispersion, Moment generating function, Theoretical distribution, Curve fitting, Correlation, Regression, Sampling.

Remark:  
Scientific calculator will be allowed during examination.

Part C - Learning Resources	
Text Books, Reference Books, Other Resources	
Suggested Readings:	
Text Books:	
1. H. C. Saxena and J. N. Kapoor: Mathematical Statistics, S. Chand and Company, 2010.	
2. E. Rukmangadachari: Probability and Statistics, Pearson Education India, First edition, 2012.	
3. राज गणेश हिन्दी प्रेस अकादमी से प्रकाशित विषय से संबंधित पुस्तकें।	
Reference Books:	
1. Vijay K. Rohatgi, A. K. Md. EhsanesSateh: An Introduction to Probability and Statistics, Wiley, 3rd edition, 2015.	
2. S. C. Gupta and V. K. Kapoor: Fundamentals of Mathematical Statistics, Sultan Chand & Sons, 2014.	
Suggested Digital Platforms Web links:	
<a href="https://www.highereducation.np.gov.in/?page=xhzQnpZwkyfQo2b%2Fy5G7w%43D%43D">https://www.highereducation.np.gov.in/?page=xhzQnpZwkyfQo2b%2Fy5G7w%43D%43D</a>	
Suggested Equivalent online courses:	
<a href="https://mptel.ac.in/courses/111106112/">https://mptel.ac.in/courses/111106112/</a>	
<a href="https://mptel.ac.in/courses/111105990/">https://mptel.ac.in/courses/111105990/</a>	
<a href="https://ugemoocs.inflibnet.ac.in/index.php/course/view_ug/213">https://ugemoocs.inflibnet.ac.in/index.php/course/view_ug/213</a>	
<a href="https://ugemoocs.inflibnet.ac.in/index.php/course/view_ug/227">https://ugemoocs.inflibnet.ac.in/index.php/course/view_ug/227</a>	

  
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Part D: Assessment and Evaluation		
Suggested Continuous Evaluation Methods:		
Maximum Marks:	100	
Continuous Comprehensive Evaluation (CCE):	25Marks	
University Exam (UE):	75Marks	
<b>Internal Assessment:</b>		
Continuous Comprehensive Evaluation (CCE)	Class Test Assignment/Presentation	15 10
		<b>Total Marks: 25</b>
<b>External Assessments</b>		
University Exam (UE) Time: 02.00 Hours	Section (A): Three Very Short Questions (50 Words Each) Section (B): Four Short Questions (200 Words Each) Section (C): Two Long Questions (500 Words Each)	03 × 03 = 09 04 × 09 = 36 02 × 15 = 30
		<b>Total Marks: 75</b>

