



Eklavya University

SESSION

2023-24

B.C.A. II SEMESTER

SYLLABUS

OF

NEP

School of Basic and Applied Sciences

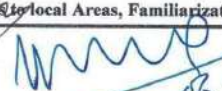
EKLAVYA UNIVERSITY, DAMOH (M.P.)

Scheme of Examination BCA II Sem

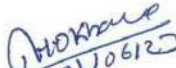

For batch admitted in Academic Session 2023-24

Subject wise distribution of marks and corresponding credits

S.No.	Name Of Course	Subject Code	Subject Name	Maximum Marks Allotted				Total Marks	Contact Periods Per week			Total Credits
				Theory Slot		Practical Slot			L	T	P	
				External (End Semester Exam)	Internals (Through CCE)	External (End Semester Exam)	Lab Work/ sessional					
1	Major	23S2BCAA2T	Programming methodology using data structure	60	40	-	-	100	4	-	-	4
2	Minor	23S2BCAB2T	Operating System	60	40	-	-	100	4	-	-	4
3	Elective	23S2BCAD1G	Numerical Methods	60	40	-	-	100	4	-	-	4
		23S2BCAD2G	Probability and Statistics									
4	Foundation Course	23FC1B	Hindi	50	-	-	-	50	2	-	-	2
5			Yoga	50	-	-	-	50	2	-	-	2
6	LAB - 1	23S2BCAA2P	Programming methodology using data structure	-	-	60	40	100	-	-	2	2
7	LAB - 2	23S2BCAB2P	Operating System	-	-	60	40	100	-	-	2	2
Total				280	120	120	80	600	16	0	4	20
Induction programme of three weeks (MC): Physical activity, Creative Arts, Universal Human Values, Literary, Proficiency Modules, Lectures by Eminent People, Visits to local Areas, Familiarization to Dept./Branch & Innovations.												

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Class		Bachelor of Computer Application (BCA)	
Semester		II Semester	
Subject & Subject Code		Programming Methodology & Data Structure (Major) & 23S2BCAA2T	
Max. Marks		60(ESE) +40(I) = 100	
Credit		Total Credits	
L	T	P	4
4	0	0	

Course Outcome:

After the completion of this course, a student will be able to do the following:

Develop simple algorithms and flow charts to solve a problem with programming using top-down principles.

1. Writing efficient and well-structured computer algorithms/programs.
2. Learn to formulate integrative solutions and array processing algorithms for problems.
3. Use recursive techniques, pointers, and searching methods in programming.
4. Will be familiar with fundamental data structures, and their implementation, and become accustomed to the description of algorithms in both functional and procedural styles.
5. Have Knowledge of the complexity of basic operations like insert, and delete search on these data structures.
6. Possess the ability to choose a data structure to suitably model any data used in computer applications.
7. Assess efficiency trade-offs among different data structure implementations.
8. Implement and know the applications of algorithms for searching and sorting.
9. Know the contributions of Indians in the field of programming and data structures.

Units	Syllabus	Periods
UNIT - I	<p>Introduction to Programming - Program Concept, Characteristics of Programming stages in program development, Algorithms, Notations, Design, Flowcharts, and Types of Programming Methodologies. Basic Introduction of C language.</p> <p>Basics of C++: A Brief History of C++, Application of C++, Compiling & Linking, Tokens, Keywords, Identifiers & Constants, Basic data types, User- Defined Data Types, Symbolic Constant, type Compatibility, Reference Variables, Operators in C++, Scope Resolution Operator, Member Dereferencing Operators, Memory Management Operators, Manipulators, Type cast operator.</p> <p>Functions In C+: The Main Function prototyping, Call by Reference Call by Address, Call by Values, Return by Reference, Inline Function, Default Arguments, Constant Arguments, Function Overloading, and Function with Array.</p>	6

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UNIT - II	<p>Classes & Objects: A Sample C++ Program with class, Defining Member Functions, Making an Outside Functions Inline, Nesting of Member Functions, Private Member Functions, Array within a Class, Memory Allocations 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>Constructor & Destructor: Constructor, Parameterized Constructor, Multiple Constructors in a Class, Constructors with Default Arguments, Dynamic Initialization of objects, Copy Constructors, Dynamic Constructor, and Destructor.</p>	8
UNIT - III	<p>Inheritance: 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 & Type Conversion, Polymorphism, Pointers, Pointers with Arrays C++, Streams, C++ Stream Classes, Unformatted I/O Operation, Formatted I/O Operation, Managing Output with Manipulators, Exceptions Handling.</p>	6
UNIT - IV	<p>Data Structure: Basic concepts, Linear and Non - Linear data structures Algorithm Specification: Introduction, Recursive algorithms, Data Abstraction, Performance analysis.</p> <p>Array: Representation of single, two- dimensional arrays, triangular arrays, sparse matrices-array, and linked representations.</p> <p>Stacks: Operations, Array and Linked implementations, Applications -Infix to Postfix Conversion, Infix to Prefix Conversion, Postfix Expression Evaluation, Recursion Implementation.</p> <p>Queues: Definition, Operations, Array, and Linked Implementations. Circular Queue-Insertion and Deletion Operations, Dequeue (Double Ended Queue), Priority Queue-Implementation.</p>	7
UNIT - V	<p>Linked Lists: 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>Tress: Representation of Tress, Binary Tress, Properties of Binary Trees, binary Tress Representations - Array and Linked representations, Binary Tree traversals, Threaded binary Trees.</p> <p>Heap: Definition, Insertion, Deletion.</p>	7
UNIT - VI	<p>Graphs: Graph ADT, Graph Representation, Graph Traversals, Searching. Hashing: Introduction, Hash tables, Hash functions, Overflow Handling.</p> <p>Sorting: Bubbles Sort, Selection Sort, Insertion Sort, Quick Sort, Merge Sort, Comparison of Sorting Methods.</p> <p>Search Trees: Binary Search Trees, AVL Trees- Definition and Examples.</p>	7

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UNIT - VII	Indian Contribution to the field: Innovation in India, the origin of Julia Programming Language, Indian Engineers who designed new programming languages, open source languages, Dr. Sartaj Sahni- computer scientist- pioneer of data structures, Other relevant contributors and contributions.	2
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Text Books: –

1. J. R. Hanly and E.B. Koffman, "Problem Solving and Program Design in C" Pearson, 2015
2. E. Balguruswamy, "C++", TMH Publication ISBN 0-07-462038-X
3. Herbert Schildt, "C++ The Complete Reference "TMH Publication ISBN 0-07-463880-07

Reference Books: --

1. R. Lafore, 'Object Oriented Programming C++'
2. N. Dale and C, Weems, "Programming and problem-solving with C++: brief edition", Jones & Bartlett Learning.
3. Adam Drozdek, "Data Structures and Algorithms in C++" Third Edition, Cengage Learning.
4. Sartaj Sahani, " Data Structures, Algorithms and Application with C++", McGraw Hill.
5. Robert L. Kruse, " Data Structures and Program Design in C++", Pearson.
6. D.S. Malik, "Data structure using C++", Second edition, Cengage Learning.
7. M.A. Weiss " Data structures and Algorithm Analysis in C". 2nd edition, Pearson.
8. Lipschutz, "Schaum's outline series Data structures", Tata McGraw-Hill

Suggestive Digital Platform Web Links:

1. <https://www.youtube.com/watch?v=BCIS40yzssA>
2. <https://www.youtube.com/watch?v=vLnPwxZdW4Y&vI=en>
3. <https://www.youtube.com/watch?v=UnnlZO5ltZw>

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Class		Bachelor of Computer Application (BCA)	
Semester		II Semester	
Subject & Subject Code		Programming Methodology and Data Structure Lab (Major-P) & 23S2BCAA2P	
Max. Marks		60(E) +40(I) = 100	
Credit		Total Credits	
L	T	P	2
0	0	2	
Course Outcome: After the completion of this course, a student shall be able to do the following: 1. Develop simple algorithms and flow charts to solve a problem with programming using top-down design principles. 2. Write efficient and well-structured computer algorithms/programs 3. Learn to formulate iterative solutions and array processing algorithms for problems. 4. Use recursive techniques pointers and searching methods in programming. 5. Possess ability to choose a data structure to suitable model any data used in computer applications. 6. Implement and know the applications of algorithms for searching and sorting etc.			

Practical List

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

1. Write a program to swap the contents of 2 variables.
2. Write a program for finding the roots of the Quadratic Equation.
3. Write a program to find an area of a circle rectangle square using a switch case.
4. Write a program to print a table of any number.
5. Write a program to print the Fibonacci series.
6. Write a program to find the factorial of a given number using recursion.
7. Write a program to convert decimal (integer) number into equivalent binary number.
8. Write a program to check given strings is palindrome or not.
9. Write a program to print the digits of the entered number in reverse order.
10. Write a program to print the sum of 2 matrices.

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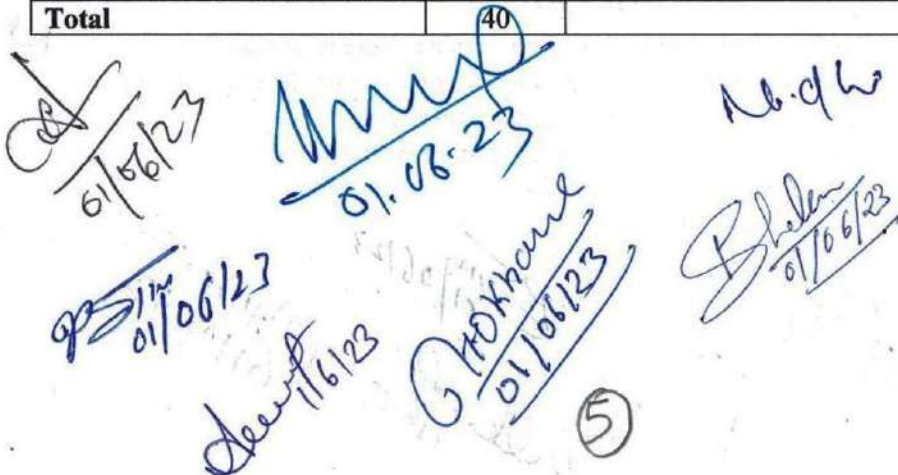
11. Write a program to print the multiplication of 2 matrices.
12. Write a program to generate an even/odd series from 1 to 100.
13. Write a program on whether a given number is prime or not.
14. Write a program for a call by value and call by reference.
15. Write a program to create a pyramid structure

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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 the constructor.
19. Write a program to design a class time with hours minutes and seconds as data members user data function to form 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 the largest element from an array.
22. Write a program to implement push and pop operations on stack using array.
23. Write a program to inform insert and delete operations on a query 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 write a program for quicksort
28. Write a program for insertion sort
29. Write a program for insertion sort.
30. Write a program for implement linked list

Assessment and Evaluation			
Suggested Continous Evaluation Methods:			
Internal Assessment	Marks	External Assessment	Marks
Class Interaction/ Quiz	10	Viva Voice on Practical	10
Attendance	10	Practical Record File	10
Assignment (Charts/Model/Seminar/Rural Service/Technology Dissemination/Report of Excursion/Lab Visits/Survey/Industrial Visit)	20	Table Work/ Experiments	40
Total	40		60



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Class			Bachelor of Computer Application (BCA)			
Semester			II Semester			
Subject & Subject Code			Operating System (Minor) & 23S2BCAB2T			
Max. Marks			60 (ESE) + 40(I) = 100			
Credit		Total Credits	4			
L	T					P
4	0					0
Course Outcome:						
<p>After the completion of this course, a student shall be able to do the following:</p> <ol style="list-style-type: none"> 1. Describe the importance of computer system resources and the role of operating systems in their management policies and algorithms. 2. Specify the objectives of modern operating systems and describe how operating systems have evolved. 3. Understand various process management concepts and can compare various scheduling techniques, synchronization, and deadlocks. 4. Describe the concepts of memory management techniques. 5. Identify the best-suited process management technique for any process. 6. Describe various file operations, file allocation methods, and disk space management. 7. To understand and identify potential threats to operating systems and the security features to guard against them. 8. Learn to operate the Linux system. 						
Unit	Syllabus				Periods	
UNIT - I	<p>Introduction to Operating System: What is an operating system? History and Evolution of OS, Basic OS functions, Resource Abstraction, Types of Operating Systems - Batch system, Multiprogramming System Multiprocessing System, Time Sharing system, Distributed OS, Real-time systems. The operating system for personal computers, Workstations, and Hand-held Devices.</p> <p>Applications of various operating systems in the real world. Some prevalent operating system- are Windows, UNIX/Linux, Android, MacOS, Blackberry OS, Symbian, Bada etc. concurrency and synchronization.</p>				6	
UNIT - II	<p>Process management: Process Concepts, process states & process control Block.</p> <p>Process Scheduling: Scheduling criteria, scheduling Algorithms (Preemptive & Non- Preemptive - FCFS, SJE, SRTN, RR, Priority Multiple - Processor, Real-Time, Multilevel Feedback Queue scheduling.</p> <p>Deadlock - Definition, Deadlock characterization, Necessary and sufficient conditions for Deadlock.</p> <p>Deadlock Handling Approaches: Prevention, Avoidance, Detection, and recovery.</p>				7	

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UNIT - III	<p>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.</p> <p>File management: Concept of the File system (File Attributes, Operations, Types), Functions of the File system, Types of the 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)</p>	7
UNIT - IV	<p>Disk Management: Structure, Disk scheduling Algorithms (FCFs, SSTF, SCAN, C-SCAN, LOOK), swap space Management, Disk reliability, recovery.</p> <p>Security: Security threats, Security policy mechanism, Protection, Trusted systems, Authentication, internal Access Authorization, Windows security.</p>	7
UNIT - V	<p>LINUX: Introduction, History, and features of Linux, advantages, hardware requirements for installation, 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, installing the Linux system, system - start-up and shut-down process, in it and run levels. Process, Swap, Partition, fdisk, checking disk free spaces. Difference between CLI OS & GUI OS, Windows v/s Linux, Importance of Linux kernel, Files, and Directories. Concept of open-source Software.</p>	7
UNIT - VI	<p>Indian contribution to the field - the BOSS operating system, open-source software, growth of LINUX, Aryabhata Linux, contributions of innovators Rajen Sheth, Sunder Pichai, etc.</p>	2

Text Books: -

- 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 by sumitabh Das

References Books:

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

Suggestive digital platform web links:

1. <https://web.iitd.ac.in/~minati/MTL458.html>
2. <https://www.cse.iitb.ac.in/~mythili/os/>
3. <https://www.youtube.com/watch?v=aCJ3YgooIHQ>

Suggested equivalent online courses: <https://nptel.ac.in/courses/106102132>

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School of Basic And Applied Sciences

Class		Bachelor of Computer Application (BCA)	
Semester		II Semester	
Subject & Subject Code		Operating System Lab (Minor-P) & 23S2BCAB2P	
Max. Marks		60(E) +40(I) = 100	
Credit		Total Credits	
L	T	P	2
0	0	2	
Course Outcome:			
After the completion of this course, a student shall be able to do the following:			
1. Operate the Linux system.			
2. Do administration.			
3. Use Vi Editor			

Linux:

- Linux Directory Commands:** pwd, mkdir, ln -rf, ls, cd, cd /, cd~
- Linux File Commands:** touch, cat, cat>, cat >>, rm, cp, mv, rename
- Linux Permission Commands:** su, id, useradd, passwd, groupadd, chmod, groupdel, chown, chgrp
- Linux File Content & Filter Commands:** head, tail, tac, more, less, grep, cat, cut, grep, comm, sed, tee, tr, uniq, wc, od, sort, diff.
- Linux Utility Commands:** find, bc, locate, date, cal, sleep, time, df, mount, exit, clear, gzip, gunzip.
- Linux Networking Commands:** ip, ssh, mail, ping, host
- Edit Crontab file:** to wall message on the system at a particular time automatically.
- Vi editor:** Create a file, edit, save, and quit. Highlighting the searched term within a file. Cut, Yank, Undo

Textbooks:

- Linux by Sumitabh Das
- Linux Bible

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Assessment and Evaluation			
Suggested Continous Evaluation Methods:			
Internal Assessment	Marks	External Assessment	Marks
Class Interaction/ Quiz	10	Viva Voice on Practical	10
Attendance	10	Practical Record File	10
Assignment (Charts/Model/Seminar/Rural Service/Technology Dissemination/Report of Excursion/Lab Visits/Survey/Industrial Visit)	20	Table Work/ Experiments	40
Total	40		60

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Class			Bachelor of Computer Application (BCA)		
Semester			II Semester		
Subject & Subject Code			Numerical Methods (Elective-I) & 23S2BCAD1G		
Max. Marks			60 (ESE) + 40(I) = 100		
Credit		Total Credits			
L	T	P	4		
4	0	0			
Course Outcome: The course will enable the students to: 1. Understand numerical methods to find the solution of a system of linear equations. 2. Computer interpolation value for real data. 3. Find quadrature by using various numerical methods. 4. Solve the system of linear equations by using various numerical techniques. 5. Obtain solutions of ordinary differential equations by using numerical methods.					
Unit		Syllabus			Periods
UNIT - I		Methods for Solving Algebraic and Transcendental Equations: Bisection Method, Regula Falsi Method, Secant Method, Newton-Raphson Method, Ramanujan Method.			8
UNIT - II		Interpolation: Lagrange interpolation, Finite difference operators, Interpolation formula using Difference, Gregory-Newton Forward Difference Interpolation, Gregory-Newton Backward Difference interpolation.			8
UNIT - III		Numerical Integration: Newton-Cote's formulae, Trapezoidal rule, Simpson's 1/3 rule, Simpson's 3/8 rule, Gauss Integration.			8
UNIT - IV		Methods to solve System of Linear equations: A direct method for solving the system of Secantr equations: Gauss elimination, LU decomposition, and Cholesky decomposition. Iterative method: Jacobi Gauss-Seidel			8
UNIT - 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.			8

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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 method, Milne- Simpson method.

Remark: Specific calculator will be allowed during the examination.

Text Books: –

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.

References Books:

1. M.K. Jain, S. R. K. Lyengar, 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

Suggested Digital Platforms Web Links-

1. <https://www.highereducation.mp.gov.in/?page=xhzlQnpZwkyIQo2b%2Fy5G7w%3D%3D>
2. <https://neptel.ac.in/courses/111106101/>
3. <https://neptel.ac.in/courses/111107105/>
4. <https://neptel.ac.in/courses/111107107/>

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Class			Bachelor of Computer Application (BCA) I YEAR		
Semester			II Semester		
Subject & Subject Code			Probability and Statistics (Elective-II) & 23S2BCAD2G		
Max. Marks			60 (ESE) + 40(I) = 100		
Credit		Total Credits			
L	T	P	4		
4	0	0			
Course Outcome:					
The course will enable the students to:					
1. Describe and calculate the mean deviation, standard deviation, range, quartiles, and percentiles.					
2. Understand and use the terminology of probability.					
3. Determine whether two events are mutually exclusive and independent.					
4. Calculate probabilities using the addition and multiplication rules.					
5. Recognize and understand discrete and continuous probability distribution functions, binomial, uniform, and exponential probability distribution.					
6. Calculate and interpret the correlation coefficient.					
7. Understand the basic concepts of linear regression and correlation.					
8. Interpret the Student's probability distribution, chi-square goodness-of-fit, and F and Z tests.					
Units	Syllabus				Periods
UNIT - I	Theory of Probability- I: Event and Sample space, Probability of an event, Addition and multiplication theorem of probability, Inverse probability, and Baye's theorem. Continuous probability.				8
UNIT- II	Theory of probability: II Probability density function, function, and its application, Standard deviation of various continuous probability distributions, Mathematical expectation, Expectation of sum and product of random variable.				8
UNIT - III	Dispersion and Distribution: Measures of dispersion; Range and interquartile range, Mean deviation and Standard deviation, Moment, Skewness, and Kurtosis. Moment generating function. Theoretical distribution; Binomial, Poisson, Rectangular, Exponential.				8
UNIT - IV	Curve fitting and Correlation: Methods of least squares, Curve fitting, Correlation and regression, partial and multiple correlations (up to three variables only)				8

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UNIT - V	Sampling: A sampling of large samples Null alternative hypothesis, Errors of the first and second kind, Level of significance and critical region, Tests of significance based on chi-square (χ^2), t, F and Z distribution.	8
Keywords/Tags: Probability, Dispersion, Moment generating function, Theoretical distribution, Curve fitting Correlation, Regression, Sampling.		
Remark: Scientific calculator will be allowed during examination.		

Text Books:

1. H.C. Saxena and J.N. Kapoor: Mathematical Statistical, S. Chand and Company, 2010.
2. E. Rukmangadachari: Probability and Statistics, pearson Education India: First edition,2012.

References Books:

1. Vijay K. Rohatgi, A. K. Md. Ehsanes Saleh: 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-

1. <https://www.highereducation.mp.gov.in/?page=xhziOnpZwkyIQo2b%2Fy5G7w%3D%3D>
2. <https://neptel.ac.in/courses/111106112/>
3. <https://neptel.ac.in/courses/111105090/>
4. <https://ugcmoocs.inflibnet.ac.in/index.php/courses/view Ug/313>
5. <https://ugcmoocs.inflibnet.ac.in/index.php/courses/view Ug/327>

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