Ahmednagar Jilha Maratha Vidya Prasarak Samaj's New Arts, Commerce, and Science College, Ahmednagar (Autonomous) (Affiliated to Savitribai Phule Pune University, Pune)



National Education Policy (NEP) Choice Based Credit System (CBCS)

Programme Skeleton and Syllabus of B.C.A. Science (Major)

Implemented from

Academic Year 2023-24

Center for Advanced Studies in Applied Sciences, New Arts, Commerce and Science College, Ahmednagar(Autonomous)

	Type of Courses	III	IV Yrs	IV Yrs
		Yr	(Honours)	Research
Major	Discipline-Specific Courses (DSC)	46	74	66
Computer	Discipline Specific Elective (DSE)	08	16	16
Applications	Skill Enhancement Courses (SEC)	06	06	06
	Vocational Skill Courses (VSC)	08	08	08
	On-Job Training (OJT)	04	08	04
	Field Project (FP)	04	04	04
	Community Engagement and Service	02	02	02
	(CEP)			
	Research project	00	00	12
	Research Methodology	00	04	04
	Total (I, II and III Year)	78	122	122
Minor	Minor	20	20	20
Other	Open Elective (OE)/ Multidisciplinary	12	12	12
Courses	Courses			
	Indian Knowledge System	02	02	02
	Co-Curricular Courses	08	08	08
	Ability Enhancement Courses	08	08	08
	Value Education Courses	04	04	04
	Total	132	176	176

Credit Distribution: B.C.A. Science (Major) including Minor and OE and other courses.

Programme Framework (Course Distribution): B.C.A. Science (Major)

								l	Majo	r				Т	otal
Year		Level		Deu		Jeu	SEC	С	VS	С	FP/0 /IN/Cl	OJT EP/PR	IKS		
	Ň		Т	Р	Т	Р	Т	Р	Т	Р	Т	Р	Т	Т	P/PR
Ι	Ι	4.5	2	1	-	-	-	1	-	-	-	-	01	03	02
Ι	II	4.5	2	-	-	-		1	-	1	-	-		02	02
II	III	5.0	2	1	-	-		1	-	-	-	1		02	03
II	IV	5.0	2	1	-	-		-	-	1	-	1		02	03
III	V	5.5	2	1	1	1	-	-	-	1		1		03	04
III	VI	5.5	2	1	1	1	-	-	-	1		1		03	04
							B.Sc	. Ho	nour	s					
IV	VII	6.0	3	3	1	1	RN	1 -1	-	-	-	-		05	04
IV	VIII	6.0	3	3	1	1	-	-	-	-	-	1		04	05
B.Sc. Honours with Research															
IV	VII	6.0	2	2	1	1	RN	1 -1	-	-	-	1		04	04
IV	VIII	6.0	2	2	1	1	-	-	-	-	-	1		03	04

Center for Advanced Studies in Applied Sciences, New Arts, Commerce and Science College, Ahmednagar(Autonomous)

ar	car ester vel			Major										tal
Ye	Seme	Lev	DS	SC	D	SE	SEC		VSC	C	FP/ /IN/C	OJT EP/RP	IKS	To
			Т	Р	Т	Р	Т	Р	Т	Р	Т	Р	Т	
Ι	Ι	4.5	4	2	-	-	-	2	-	-	-	-	02	10
Ι	II	4.5	6	-	-	-		2	-	2	-	-		10
II	III	5.0	6	2	-	-		2	-	-	-	2		12
II	IV	5.0	6	2	-	-		-	-	2	-	2		12
III	V	5.5	8	2	2	2	-	-	-	2		2		18
III	VI	5.5	6	2	2	2	-	-	-	2		4		18
IV	VII	6.0	8	6	2	2	RM- 4		-	-	-	-		22
IV	VIII	6.0	8	6	2	2	-	-	-	-	-	4		22

Programme Framework (Credit Distribution): B.C.A. Science (Major)

Programme Framework (Courses and Credits): B.C.A. Science (Major)

Sr. No.	Year	Semester	Level	Course Type	Course Code	Title	Credits
1.	Ι	Ι	4.5	DSC-1	BCA-SCI111T	Basic C Programming	02
2.	Ι	Ι	4.5	DSC-2	BCA-SCI112T	Fundamentals of Computer	02
3.	Ι	Ι	4.5	DSC-3	BCA-SCI113P	Laboratory on Basic C Programming	02
4.	Ι	Ι	4.5	SEC-1	BCA-SCI114T	Mathematical Foundation for Computer Science	02
5.	Ι	Ι	4.5	IKS-1	BCA-SCI115T	Science and Technology in Ancient India	02
6.	Ι	II	4.5	DSC-4	BCA-SCI121T	Advance C Programming	03
7.	Ι	II	4.5	DSC-5	BCA-SCI122T	Computer Networks	03
8.	Ι	II	4.5	SEC-2	BCA-SCI123P	Laboratory on Advance C Programming	02
9.	Ι	II	4.5	VSC-1	BCA-SCI124P	Linux Operating System	02
10.	II	III	5.0	DSC-6	BCA-SCI231T	Data Structures using C	03
11.	II	III	5.0	DSC-7	BCA-SCI232T	Database Managemnet Systems	03

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		New Al	τs, comme	erce ana Scie	ence College, Anmeana	gar(Autonomous)	
12.	II	III	5.0	DSC-8	BCA-SCI233P	Laboratory on Data Structures using C	02
13.	II	III	5.0	SEC-3	BCA-SCI234P	Laboratory on Database Managemnet Systems	02
14.	II	III	5.0	FP-01	BCA-SCI235P	Field Project	02
15.	II	IV	5.0	DSC-9	BCA-SCI242T	Object Oriented Programming using C++	03
16.	II	IV	5.0	DSC- 10	BCA-SCI242T	Advanced Database Management Concepts	03
17.	II	IV	5.0	DSC- 11	BCA-SCI243P	Laboratory on Object Oriented Programming using C++	02
18.	Π	IV	5.0	VSC-2	BCA-SCI244P	Laboratory on Advanced Database Management Concepts	02
19.	Π	IV	5.0	CEP- 01	BCA-SCI245P	Community Engagement and Services	02
20.	III	V	5.5	DSC- 12	BCA-SCI351T	Core Java	04
21.	III	V	5.5	DSC- 13	BCA-SCI352T	Python programming	04
22.	III	V	5.5	DSC- 14	BCA-SCI353P	Laboratory on Core Java	02
23.	III	V	5.5	DSE- 01	BCA-SCI355T (A)	Object Oriented Software Engineering	02
24.	III	V	5.5	DSE- 02	BCA-SCI356P (A)	Laboratory on Object Oriented Software Engineering	02
25.	III	V	5.5	DSE- 01	BCA-SCI355T (B)	Software Tesing Manual	02
26.	III	V	5.5	DSE- 02	BCA-SCI356P (B)	Laboratory on Software Tesing Manual	02
27.	III	V	5.5	VSC-3	BCA-SCI357P	Laboratory on Python Programming	02
28.	III	V	5.5	FP-02	BCA-SCI358P	Field Project	02
29.	III	VI	5.5	DSC- 15	BCA-SCI361T	Advance Java Programming	03
30.	III	VI	5.5	DSC- 16	BCA-SCI362T	Operating System Concepts	03

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31.	III	VI	5.5	DSC-	BCA-SCI363P	Laboratory on	02		
				17		Advance Java			
						Programming			
32.	III	VI	5.5	DSE-	BCA-SCI364T	React Js	02		
				03	(A)				
33.	III	VI	5.5	DSE-	BCA-SCI365P	Laboratory on React	02		
				04	(A)	Js			
34.	III	VI	5.5	DSE-	BCA-SCI364T	Software Testing	02		
				03	(B)	(Automated)			
35.	III	VI	5.5	DSE-	BCA-SCI365P	Laboratory on	02		
				04	(B)	Software Testing			
						(Automated)			
36.	III	VI	5.5	VSC-4	BCA-SCI366P	Laboratory on	02		
						Operating System			
						Concepts			
37.	III	VI	5.5	OJT-	BCA-SCI367P	On-Job Training	04		
				01					

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B.C.A. Science (Major with Honours)

38.	IV	VII	6.0	DSC-	BCA-SCI471T	Android	03
				18		programing-I	
39.	IV	VII	6.0	DSC-	BCA-SCI472T	Data Mining and	03
				19		Data Science	
40.	IV	VII	6.0	DSC-	BCA-SCI473T	Cloud Computing	02
				20			
41.	IV	VII	6.0	DSC-	BCA-SCI474P	Laboratory on	02
				21		Android	
						programing-I	
42.	IV	VII	6.0	DSC-	BCA-SCI475P	Laboratory on Data	02
				22		Mining and Data	
						Science	
43.	IV	VII	6.0	DSC-	BCA-SCI476P	Laboratory on Cloud	02
		~ ~~~	6.0	23		Computing	
44.	IV	VII	6.0	DSE-05	BCA-SCI47/T	DJango	02
15	TT 7	X /IX			(A)	T 1	00
45.	IV	VII	6.0	DSE-06	BCA-SCI478P	Laboratory on	02
16	TT 7	X /IX	()	DOD 05	(A)	DJango	00
46.	IV	VII	6.0	DSE-05	BCA-SCI47/1	Digital Marketing	02
47	TX 7	T /TT	()		(B)	T 1 (D''(1	00
4/.	IV	VII	6.0	DSE-06	BCA-SCI4/8P	Laboratory on Diital	02
40	TT Z	VII	()		(B)	Marketing	0.4
48.	IV	VII	6.0	KM-01	BCA-	Kesearch	04
40	TX Z	VIII	()	DCC	SCI4/91/P	Methodology	02
49.	IV	VIII	6.0	DSC-	BCA-SCI4811	Android	03
50	TX /	VIII	()	24 DCC		Programming -II	02
50.	IV	VIII	6.0	DSC-	BCA-SCI4821	Artificial	03
				25		Intelligence	

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51.	IV	VIII	6.0	DSC-	BCA-SCI482T	Design and Analysis	02				
				26		of Algorithms					
52.	IV	VIII	6.0	DSC-	BCA-SCI482P	Laboratory on	02				
				27		Android					
						Programming -II					
53.	IV	VIII	6.0	DSC-	BCA-SCI482P	Laboratory on	02				
				28		Artificial					
						Intelligence					
54.	IV	VIII	6.0	DSC-	BCA-SCI482P	Laboratory on	02				
				29		Design and Analysis					
						of Algorithms					
55.	IV	VIII	6.0	DSE-07	BCA-SCI485T	Data Analytics using	02				
					(A)	Hadoop					
56.	IV	VIII	6.0	DSE-08	BCA-SCI486P	Laboratory on Data	02				
					(A)	Analytics using					
						Hadoop					
57.	IV	VIII	6.0	DSE-07	BCA-SCI485T	Block Chain	02				
					(B)	Management					
58.	IV	VIII	6.0	DSE-08	BCA-SCI486P	Laboratory on Block	02				
					(B)	Chain Management					
59.	IV	VIII	6.0	OJT-02	BCA-SCI487P	On-Job Training	04				

Ahmednagar Jilha Maratha Vidya Prasarak Samaj's New Arts, Commerce and Science College, Ahmednagar (Autonomous)

Sr. No.	Name	Designation
1.	Prof.Arun.D.Gangarde	Chairman
2.	Prof. Priyamvada Patil	Member
3.	Dr.Shraddha Ingale	Member
4.	Dr.Mudassar Shaikh	Member
5.	Dr.Santosh Khamitkar	Academic Council Nominee
6.	Dr. Shankar Mali	Academic Council Nominee
7.	Dr.Nitin Patil	Vice-Chancellor Nominee
8.	Mr.Summit Suryawanshi	Alumni
9.	Dr.Deepak Shikarpur	Industry Expert
10.	Prof.Deepali Jagdale	Co-Opted Member
11.	Dr.Madhukar Shelar	Co-Opted Member

Board of Studies in Computer Applications

1. Prologue/ Introduction of the programme:

- The Bachelor of Computer Applications (BCA) ia a undergraduate program of four-year that span eight semesters.
- The course is mainly designed to bridge the gap between the study of computers and its applications.
- This program aims to shape computer professionals with the right moral and ethical values and can prepare students to face the challenges and opportunities in the IT Industry of India by building strong foundations.
- The syllabus focuses on the core fundamentals of computer science, but generally undergoes revision according to the industry requirement with the aim of increasing employment opportunities for students.
- BCA graduates can seek job opportunities in fields like software development, web design, systems management, quality assurance and software testing, Data Science, Cloud Computing.
- A BCA graduate can work in IT companies big and small in various roles.

2. Programme Outcomes (POs)

- An ability to apply knowledge of computing fundamentals for the solution of complex Problems.
- An ability to design and develop as model, component, or process to meet desired needs with in constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability and sustainability.
- Select and apply appropriate techniques, resources and modern IT tools, including prediction and modeling.
- An understanding of professional, social and ethical responsibility, norms of Industry practice.
- An ability to function with multi-disciplinary teams
- An ability to exhibit knowledge understanding and application management principles.

Ahmednagar Jilha Maratha Vidya Prasarak Samaj's New Arts, Commerce and Science College, Ahmednagar (Autonomous) Syllabus B.C.A. Science (Major)

Title of	Title of the Course: Basic C Programming										
Year: I											
Course	Course Code	Credit Distr	ribution	Credits	Allotted	Alle	otted M	Iarks			
Туре		Theory	Practical		Hours						
						CIE	ESE	Total			
DSC-1	BCA-	02	00	02	30	15	35	50			
	SCI111T										

Learning Objectives:

1. Design solutions to simple engineering problem by applying the basic programming principles of C language and basic mathematical knowledge.

2. Choose a suitable C-construct to develop C code for a given problem.

3. Recognize the bugs in the C program.

4. Apply the C-language syntax rules to correct the bugs in the C program.

5. Develop simple C programs to illustrate the applications of different data types such as arrays.

Course Outcomes (Cos) : After the completion of this course, students will be able to:-

1.Illustrate and explain the basic computer concepts and programming principles of C language.

2. Develop C programs to solve simple mathematical and decision making problems.

3. Develop C programs to solve simple engineering problems using looping constructs and functions.

4. Develop C programs to demonstrate the applications of derived data types such as arrays.

Unit I	Introduction to Programming:	4 hrs
	1.1 Basic Difference between Procedure Oriented Language and	
	Object Oriented Language.	
	1.2 Concepts of Machine level, Assembly level and High level	
	programming.	
	1.3 Flow charts and Algorithms .	
Unit II	Fundamentals of 'C':	6 hrs
	2.1 Features of C language, structure of C program, comments,	
	header files.	
	2.2 Data types, constants and variables.	
	2.3 Operators :	
	Arithmetic operators, Increment and decrement operators,	
	Relational operators, Logical operators, The bitwise operators,	

	New Arts, Commerce and Science College, Ahmednagar(Autonomous)	
	The assignment operators, The conditional operator, The size of	
	operator, The comma operator, Type casting operator.	
	2.4 Expressions:	
	evaluation of expressions, type conversion, precedence and	
	associativity.	
	2.5 Basic I/O functions.	
Unit III	Control Structures in 'C':	5 hrs
	3.1 Types of Statements:	
	3.2 Simple statements.	
	3.3 Decision making statements: If, ifelse, switch	
	3.4 Looping statements or Iterative Statements:	
	for loop, while loop, do-while loop	
	3.5 Nesting of control structures.	
	3.6 Jump Statements:	
	Break and continue statement, goto statement.	
Unit IV	Function:	7 hrs
	4.1 Introduction:	
	Definition, need of using functions, Advantages of using	
	functions.	
	4.2 Function Prototype :	
	Declaration, calling a function, Defining a function, Return	
	statement.	
	4.3 Types of functions:	
	main() function, Library Function, Local and global variables	
** * **	4.4 Recursion, Nested functions.	
Unit V	Array:	8 hrs
	0.1 Introduction : Definition Declaration of armour Need Downdomy Checking	
	6.2 One Dimensional arrays. Need, Boundary Checking	
	Unitialization accessing element of 1D arrays Reading and	
	displaying elements	
	6 3 Two dimensional arrays ·	
	Declaration of 2D arrays. Initialization of 2D arrays. Accessing	
	element of 2D arrays ,Reading and displaying elements.	
	6.4 Memory representation of array [Row Major, Column Major]	
	6.5 Multidimensional array	
	6.6 Array and Function:	
	1D array and function, 2D array and function	

Suggested Readings/Material:

1. R.G.Dromey, "How to Solve it by Computer", Pearson Education, India, 2008.

2. "C" Programming" Brian W. Kernighan and Denis M. Ritchie.

PHI 2nd Edition

3. Let us C Yashwant P. Kanetkar,

BPB publication

4. 21st Century C Ben Klemens OReilly 1st 2012

5. E. Balaguruswamy, "Programming in ANSI C", ISBN: 9781259004612, Tata Mc-Graw Hill Publishing Co Ltd.-New Delhi

New Arts, Commerce and Science College, Ahmednagar (Autonomous) Syllabus B.C.A. Science (Major)

Title of the Course: Fundamentals of Computer									
Year: I				nester: I					
Course	Course Code	Credit Distr	ribution	Credits	Allotted	Allotted Marks			
Туре		Theory	Practical		Hours				
						CIE	ESE	Total	
DSC-2	BCA-	02	00	02	30	15	35	50	
	SCI112T								

Learning Objectives:

- 1. To learn the basic components of a computer along with their functions.
- 2. To learn generation, classification and application of computers.
- 3. Knowledge of computer equipment, including both hardware and software

Course Outcomes (Cos):

- 1. Understanding the concept of input and output devices of computers and recognize the basic terminologies.
- 2. Familiarize operating systems, programming languages, networking, multimedia and internet.
- 3. Understand the basic computer organization.
- 4. Understand the memory and I/O organization of the computer.

Unit I	Introduction to Computer System	04 hrs
	1.1 Introduction, Characteristics of Computers,	
	Block diagram of computer	
	1.2. Types of computers and features- Mini Computers,	
	Micro Computers, Mainframe Computers,	
	Super Computers, Laptops and Tablets	
	1.3 Types of Programming Languages- Machine	
	Languages, Assembly Languages, High	
	Level Languages	
	1.4. Translators- Assembler, Compiler, Interpreter	
	1.5. Data Organization- Drives, Files, Directories	
Unit II	Introduction to Computer Peripherals	04 hrs
	2.1. Primary and Secondary storage devices	
	2.2. Primary storage devices – RAM, ROM,	
	PROM, EPROM	
	2.3. Secondary Storage Devices - CD, HD, Pen drive	
	2.4. I/O Devices- Scanners, Digitizers, Plotters, LCD,	
	Plasma Display,	
	2.5. Pointing Devices –Mouse, Joystick, Touch Screen	
	2.6. Number Systems	

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	2.7 Introduction to Binary, Octal, Hexadecimal				
	system Conversion, Simple Addition,				
	Subtraction, Multiplication, Division.				
Unit III	Computer software and hardware	03 hrs			
	3.1 Introduction Meaning of computer software and				
	hardware difference between hardware				
	and software				
	3.2 Types of software				
	2.2 Types of computer languages (low lovel machine				
	5.5 Types of computer languages (low level, machine				
	level, assembly level, night level)				
	3.4 Translator, assembler, compiler, interpreter				
Unit IV	Operating System	04 hrs			
	4.1 Definition and function.				
	4.2 Batch processing.				
	4.3 Spooling.				
	4.4 Multiprogramming				
	4.5 Multiprocessing				
	4.6 Time sharing.				
	4.7 Online and real time processing.				
	4.8 Library and Utility program.				
Unit V	Introduction to computer organization	08 hrs			
	5.1 Architecture of computer organization				
	5. 2 Block diagram of CPU				
	5.3 Functions of CPU				
	5.4 General register organization				
	5.5 Flags, Concept of RISC and CISC, ALU.				
	5.6 Organization of pipelining				
	5.7 Overview of super-scalar and				
	super-pipelined organizations				
	5.8 Control unit operation				
	5.9 System buses Multi-bus organization and				
	stack organization				
Unit VI	Memory and I/O organization	07 hrs			
	6.1 System memory				
	6.2 classification of memories				
	6.3 Memory organization				
	6.4 Cache memory Types and organization				
	6.5 Virtual memory Meaning, implementation				
	6.6 Memory management unit.				
	6. 7 Input/output Types of I/O data transfer, Need				
	of I/O i interface, Accessing I/O devices 5				
	6.8 Direct Memory Access and DMA controller				
	CO Interments and Interment Construction				

Suggested Readings/Material:

1. Computer Fundamental By P.K. Sinha Chapters: 1-5, 7-10, 12, 14-16.

2. Computer for Beginner By V.P. Jaggi and S. Jain. Chapters : 1, 2, 3, 5, 7

3. Computer organization - V. Carl, Zvonko G., Safwat G.Zaky, McGraw-Hill, international Edition

4. Computer organization - William Stalling, PHI, Fourth Edition

Center for Advanced Studies in Applied Sciences, New Arts, Commerce and Science College, Ahmednagar(Autonomous) Ahmednagar Jilha Maratha Vidya Prasarak Samaj's New Arts, Commerce and Science College, Ahmednagar (Autonomous) Syllabus

B.C.A. Science (Major)

Title of the Course: Laboratory on Basic C Programming										
Year: I				nester: I						
Course	Course Code	Credit Distr	ribution	Credits	Allotted	Allotted Marks		larks		
Туре		Theory	Practical		Hours					
						CIE	ESE	Total		
DSC-3	BCA-	00	02	02	60	15	35	50		
	SCI113P									

Learning Objectives:

1. Understand the logic for a given problem, Write the algorithm of a given problem and draw flow chart of a given problem.

2. Recognize and understand the syntax and construction of C programming code.

3. Know the steps involved in compiling, linking and debugging C code.

4. Learn the methods of iteration or looping and branching.

Course Outcomes (Cos):

After Completion of the Course student will be able to:

1.write code to solve basic mathematical and computer problems

- 2. Make use of different data-structures like arrays
- 3. Understand how to access and use library functions.
- 4. Understand function declaration and definition and use of user defined functions.

Assignment 1	a)Write a C program to find sum and average of three numbers.b)Write a C program to find the sum of individual digits of a given positive integer.c)Write a C program to find the roots of a quadratic equation
Assignment 2	a)Write a C program to generate prime numbers between 1 to n.b)Write a C program to Check whether given number is Armstrong Number or Not
	c) Write a C program to evaluate algebraic expression (ax+b)/(ax-b).
Assignment 3	a)Write a C program to check whether given number is perfect number or
	Not.
	b)Write a C program to check whether given number is strong number or not.
Assignment 4	a) Write a C program to generate the first n terms of the Fibonacci sequence
	b)Write a C program perform arithmetic operations using switch statement.
Assignment 5	a)Write a C program to find factorial of a given integer using function.

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	b)Write a C program to find factorial of a given integer using recursive function.				
	c)Write C program to find GCD of two integers by using recursive function.				
	d)Write C program to find GCD of two integers using non-recursive function.				
Assignment 6	a)Write a C program to find both the largest and smallest number in a list of				
	integers. b) Write a C Program to Sort the Array in an Ascending Order.				
	c) Write a C Program to find whether given matrix is symmetric or not.				
Assignment 7	a) Write a C program to perform addition of two matrices.				
	b)Write a C program that uses functions to perform Multiplication of Two Matrices.				
Assignment 8	a)Write a C program to use function to insert a number in to given main array at a				
	given position.				
	b) Write a C program that uses functions to delete n numbers from a given position				
	in a given array.				
Assignment 9	a)Write a C program using user defined functions to determine whether the given				
	number is palindrome or not.				
	b)Write a C program using user defined functions to determine whether the given				
	number is armstrong or not.				
	c) Write a C program using user defined functions to determine x raise to y				
Assignment	a) Write a C program to pass a 1 D array to a function. using user defined function				
10	calculate the sum and average of the array.				
	b) Write a C program to pass a 2 D array to a function. using user defined function				
	calculate the sum and average of the array elements				

Suggested Readings/Material:

1. R.G.Dromey, "How to Solve it by Computer", Pearson Education, India, 2008.

2. "C" Programming" Brian W. Kernighan and Denis M. Ritchie. PHI 2nd Edition

3. Let us C Yashwant P. Kanetkar, BPB publication 21st Century C Ben Klemens OReilly 1st 2012

4. E. Balaguruswamy, "Programming in ANSI C", ISBN: 9781259004612, Tata Mc-Graw Hill Publishing Co Ltd.-New Delhi

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New Arts, Commerce and Science College, Ahmednagar (Autonomous) Syllabus B.C.A. Science (Major)

Title of the Course: Mathematical Foundation for Computer Science									
Year: I Se				ester: I					
Course	Course Code	Credit Distribution		Credits	Allotted	Allotted Marks		larks	
Туре		Theory	Practical		Hours				
						CIE	ESE	Total	
SEC-1	BCA-	02	00	02	60	15	35	50	
	SCI114T								

Learning Objectives:

- 1. To learn basic conceptual mathematics by set theory and logic
- 2. To understand different relations, functions and counting methods
- 3. To impart different data presentation and correlation techniques
- 4. To recognize sampling theories
- 5. To learn and implement probability functions

Course Outcomes (Cos):

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

- 1. Relate and apply techniques for constructing mathematical proofs and make use of appropriate set operations, propositional logic to solve problems
- 2. Use function or relation models to interpret associated relation
- 3. Apply basic counting techniques and use principles of probability
- 4. Given a data, compute various statistical measures of central tendency
- 5. Use appropriate Sampling techniques

Unit I	Set Theory and Logic	15 hrs
	1.1 Sets: Set Theory, Need for sets, Representation of sets, Set Operations	
	Cardinality of Set, Types of sets-bounded and Unbounded Sets, Countable	
	and Uncountable Sets, Finite and Infinite Sets, Countably Infinite and	
	Uncountably, Infinite Sets, Power Set .	
	1.2 Propositional Logic: Logic, Propositional Equivalences, Application	
	of Propositional Logic- Translating English Sentences, Proof by	
	Mathematical Induction and Strong Mathematical Induction	
	Relations and Functions	

1	New Arts, Commerce and Science College, Ahmednagar(Autonomous)						
	1.3 Relations: Properties, n-ary Relations and Applications, Representing						
	Relations, Closures of Relations, Equivalence Relations, Partial						
	Orderings,						
	Partitions, Hasse Diagram, Lattices, Chains and Anti-Chains, Transitive						
	Closure, Warshall's Algorithm						
	1.4 Functions: Surjective, Injective and Bijective Functions, Inverse						
	Functions and Compositions of Functions						
	Counting						
	1.5 The Basics of Counting						
	1.6 Rule of Sum and Product						
	1.7 Permutations and Combinations						
	1.8 Binomial Coefficients and Identities						
	1.0 Generalized Permutations and Combinations						
	1.10 The Discontrole Dringing						
TT •/ TT	1.10 The Pigeonhole Principle						
Unit II	Data presentation and Aggregation	15 hrs					
	2.1 Data Types : Attributes, Variable, Discrete and Continuous Variable						
	2.2 Data Presentation, Frequency Distribution, Histogram, Ogive, Box-						
	Plot, Bar Plots						
	2.3 Mean, Median, Mode and other Measures of Central Tendency						
	Arithmetic Mean (AM), Weighted Arithmetic Mean, Arithmetic Mean						
	Computed from Grouped Data, Concept of Mean, Median, Mode,						
	Geometric Mean (GM), Harmonic, Mean(HM), Quartiles, Deciles and						
	Percentiles.						
	2.4 Standard Deviation and Other Measures of Dispersion, Standard						
	Deviation, Root Measure Square, Variance Absolute and Relative						
	Dispersion						
	Correlation Theory and Sampling						
	2.5 Moments Skewness and Kurtosis: Moments Computation of						
	Moments for Group Data Skewness Kurtosis Computation of Skewness						
	and Kurtosis						
	2.6 Correlation: Divariate data Scatter Diets Linear Correlation						
	2.0 Correlation. Bivariate data, Scatter Flots, Effect Correlation,						
	Correlation of Autobules, Coefficient of Correlation						
	2.7 Linear Regression : Concept, Least-Squares Method, Regression						
	2.8 Elementary Sampling Theory: Sampling Theory, Random Samples						
	and Random Numbers, Sampling with and Without Replacement,						
	Stratified sampling						
	Probability and Hypothesis Testing						
	2.9 Probability: Random Experiment, Sample Space, Events Types and						
	Operations of events, Probability Definition, Axioms (The Four						
	Elementary Theorems) of Probability (without Proof), Conditional						
	Probability, 'Bayes' Theorem (without Proof), Examples						
	Mathematical Expectations						
	2.10 Standard Deviation: Continuous and Discrete. PDF/PMF.						
	Introduction and properties (without proof) for Rinomial Normal						
	standard Normal Chi-square t F distributions						
	standard normal, Chi-square, t, 1 distributions						

Suggested Readings/Material:

- 1. Mathematics Structures for Computer Science by Judith Gersting- Macmillon.
- 2. Foundation Mathematics for Computer Science –Visual Approach by John Vince, Springer
- 3. Probability & Statistics by SPIEGEL, McGraw Hill
- 4. Fundamentals of Statistics by S.C. Gupta
- 5. Fundamentals of Applied Statistics by S.C. Gupta

Center for Advanced Studies in Applied Sciences, New Arts, Commerce and Science College, Ahmednagar(Autonomous) Ahmednagar Jilha Maratha Vidya Prasarak Samaj's

New Arts, Commerce and Science College, Ahmednagar (Autonomous) Syllabus B.C.A. Science (Major)

Title of the Course: Science and Technology in Ancient India									
Year: I Semester: I									
Course	Course Code	Credit Distribution		Credits	Allotted	Allotted Marks		larks	
Туре		Theory	Practical		Hours				
						CIE	ESE	Total	
IKS-1	BCA-	02	00	02	30	15	35	50	
	SCI115T								

Learning Objectives:

1. To introduce learners to the landscape of Vedic literature with broad taxonomy of Indian knowledge systems.

2. Creating awareness amongst the youths about the true history and rich culture of the country.

3. Understanding the scientific value of the traditional knowledge of India.

4. Promoting the youths to do research in the various fields of Indian knowledge system.

Course Outcomes (Cos):

1. youth will be aware about the true history and rich culture of the country, also the history of printing and publishing in India.

2. Youths can do research in various interdisciplinary courses of Indian knowledge system.

Unit I	Importance of the Study of History of Science	15					
	1.1 Indian Knowledge System and overview.						
	1.2 Importance of Ancient Knowledge						
	1.3 Defining Indian Knoelwdgw system.						
	1.4 The IKS corpos-a classification framework						
	1.5 The vedic corpos –Introduction to vedas and four vedas						
	1.6 vedic life features						
Unit II	History of Mathematics in Ancient India	15					
	2.1 Number system and unit of measurements.						
	2.2 Gautam Buddha philosophy on number system.						
	2.3 Historical evidence of number system in India.						
	2.4 Features of Indian Number Sytsem.						
	2.5 Approaches to represent Number.						
	2.6 Measurement of time, distance and weight.						
	2.7 Pingala and the binary system.						
	2.8 Great mathematicians and their contributions						
	2.9 Unique aspects of Indian Mathematics.						

Suggested Readings/Material:

https://ndl.iitkgp.ac.in/ https://doaj.org/ https://www.doabooks.org/ https://nptel.ac.in/ https://shodhganga.inflibnet.ac.in/ https://epgp.inflibnet.ac.in/ https://oatd.org/ https://openknowledge.worldbank.org/ http://liiofindia.org/ http://www.oapen.org/content/ https://www.ncbi.nlm.nih.gov/pmc/?cmd=search&term https://dev.gutenberg.org/ https://www.highwirepress.com/ https://libguides.southernct.edu/openaccess http://agris.fao.org/agris-search/index.do https://www.sciencedirect.com/#open-access https://www.aiddata.org/ https://ilostat.ilo.org/ https://academic.oup.com/journals/pages/open_access https://www.projecteuclid.org/librarians/lib_oa https://www.springeropen.com/journals https://www.tandfonline.com/openaccess/openjournals https://www.cambridge.org/core/what-we-publish/open-access

Ahmednagar Jilha Maratha Vidya Prasarak Samaj's New Arts, Commerce and Science College, Ahmednagar (Autonomous) Syllabus B.C.A. Science (Major)

Title of the Course: Advance C Programming									
Year: I			Sem	ester: II					
Course	Course Code	Credit Distr	ribution	Credits	Allotted	Allotted Marks		Iarks	
Туре		Theory	Practical		Hours				
						CIE	ESE	Total	
DSC-4	BCA-	03	00	03	45	30	70	100	
	SCI121T								

Learning Objectives:

- 1. Arranging data in arrays and strings.
- 2.Implementing pointers
- 3.Understanding derived data types like strucutres and unions
- 4. File management and dynamic memory allocation

Course Outcomes (Cos):

After Completion of the course student will be able to :

1.Implement strings in your C program

- 2. Store different data types in the same memory
- 3.Repeat the sequence of instructions and points for a memory location
- 4. Apply code reusability with functions and pointers
- 5.Understand the basics of file handling mechanisms
- 6.Explain the uses of pre-processors and various memory models

Unit I	Introduction to C Preprocessor:	6 hrs
	1.1Introduction:	
	Definition of Preprocessor, Types of Preprocessors	
	1.2Macros :	
	Macros versus function, advantages, types.	
	1.3 File inclusion directives	
	1.4 Conditional compilation processors	
	1.5 Predefined macros 1.8 Preprocessor Operator	
Unit II	Pointers:	12 hrs
	2.1 Introduction	
	Definition and declaration, Initialization.	
	2.2 Indirection operator, Address of operator	
	2.3 Types of Pointers	
	2.4 Pointer arithmetic	

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	2.5 Dynamic memory allocation	
	2.6 Arrays and pointers	
	2.7 Pointer to array	
	2.8 Array of pointers	
	2.9 Function and pointers :	
	Call by value and call by reference, Function pointer.	
	2.10 Pointers & const- Constant pointer, pointer to a constant	
Unit III	Strings:	10 hrs
	3.1 Introduction- Definition, Declaration, Initialization	
	3.2 Importance of terminating NULL character	
	3.3 Strings & pointers	
	3.4 String and Function :User Defined ,Standard library function	
	<pre>strlen(), strcpy(), strcat(),strcmp() etc</pre>	
	3.5 Command line arguments – argc and argv	
Unit IV	Structures and Union:	10 hrs
	4.1 Introduction to structures -Definition Declaration Variables	
	initialization. Accessing fields and structure operations	
	4.2 Nested structures	
	4.3 Array of structure variables	
	4.4 Structure and function	
	4.5 pointer and structure- Declaration Initialization Accessing	
	members using pointer	
	4.6 Introduction to unioin- Definition Declaration Initialization	
	4.7 Differentiate between Union and structure	
	4.8 Nested structures and unions	
	4.9 Use of Bitfields	
Unit V	File Handling:	7 hrs
	5.1 Introduction- Defining and opening a file, closing a	
	File.(fopen, fclose)	
	5.2 Input/output and Error Handling on Files-library functions	
	for file handling –fgetc, fseek, fgets, fputc etc, feof, rewind etc	

Suggested Readings/Material:

1. R.G.Dromey, "How to Solve it by Computer", Pearson Education, India, 2008.

- 2. "C" Programming" Brian W. Kernighan and Denis M. Ritchie.PHI 2nd Edition
- 3. Let us C Yashwant P. Kanetkar, BPB publication
- 4. 21st Century C Ben Klemens OReilly 1st 2012
- 5. E. Balaguruswamy, "Programming in ANSI C", ISBN: 9781259004612, Tata Mc-Graw Hill Publishing Co Ltd.-New Delhi

Ahmednagar Jilha Maratha Vidya Prasarak Samaj's New Arts, Commerce and Science College, Ahmednagar (Autonomous) Syllabus B.C.A. Science (Major)

Title of the Course: Computer Networks								
Year: I			Sem	ester: II				
Course	Course Code	Credit Distr	ribution	Credits	Allotted	Alle	otted M	Iarks
Туре		Theory	Practical		Hours			
		-						
						CIE	ESE	Total
DSC-5	BCA-	03	00	03	45	30	70	100
	SCI122T							

Learning Objectives:

1. To gain knowledge about Computer Networks concepts.

2. To know about working of networking models, addresses, transmission medias and connectivity devices.

3. To acquire information about network security and cryptography.

Course Outcomes (Cos):

1. Describe the general principles of data communication.

2. Describe how computer networks are organized with the concept of layered approach.

3. Evaluate the challenges in building networks and solutions to those.

Unit I	Introduction to Computer Network	10 hrs
	1.1Basics of Computer Network	
	1.1.1 Definition	
	1.1.2 Goals	
	1.1.3 Applications,	
	1.1.4 Network Hardware –Broadcast, Point to Point	
	1.1.5 Components of Data Communication	
	1.2 Network Topologies	
	1.2.1 Mesh	
	1.2.2 Star,	
	1.2.3 Bus,	
	1.2.4 Ring	
	1.3 Types of Networks	
	1.3.1 LAN, MAN, WAN,	
	1.3.2 Internetwork,	
	1.3.3 Wireless Network	
	1.4 Modes of Communication	
	1.4.1 Simplex,	
	1.4.2 Half Duplex,	
	1.4.3 Full Duplex	
	1.5. Server Based LANs & Peer-to-Peer LANs	

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	1.6. Protocols and Standards	
	1.7. Network Software	
	1.7.1 Protocol Hierarchies, Layers, Peers, Interfaces	
	1.7.2 Design Issues of the Layers	
	1.7.3 Connection Oriented and Connectionless Service	
Unit II	Network Models	8 hrs
	2.1 OSI Reference Model: Functions of each Layer	
	2.2 TCP/IP Reference Model, Comparison of OSI and TCP/IP	
	8	
	SPPU BBA(CA)COURSE CONTENT-SEMESTER III and IV	
	CBCS/2019 PATTERN Annexure I Page20	
	Reference Model	
	2.3 TCP/IP Protocol Suite	
	2.4 Addressing	
	2.4.1Physical Addresses	
	2.4.2 Logical Addresses	
	2.4.3Port Addresses,	
	2.4.4 Specific Addresses	
	2.5 IP Addressing	
	2.5.1 ClassfullAddressing	
	2.5.2 Classless Addressing	
Unit III	Transmission Media	8 hrs
	3.1Introduction, Types of Transmission Media	
	3.2 Guided Media:	
	3.2.1Twisted Pair Cable- Physical Structure, Categories,	
	Connectors	
	& Applications	
	3.2.2Coaxial Cable – Physical Structure, Standards, Connectors	
	&	
	Applications	
	3.2.3Fiber Optic Cable- Physical Structure, Propagation	
	Modes, Connectors & Applications	
	3.3 Unguided Media:	
	3.3.1Electromagnetic Spectrum for Wireless Communication	
	3.3.2Propagation Modes Ground, Sky,Line-of-Sight	
	3.3.3Wireless Transmission: Radio Waves, Microwaves, Infrared	
Unit IV	Wired and Wireless LAN	8 hrs
	4.1 IEEE Standards	
	4.2 Standard Ethernet MAC Sublayer, Physical Layer	
	4.3 Fast Ethernet – Goals, MAC Sublayer, Topology,	
	Implementation	
	4.4 Gigabit Ethernet – Goals, MAC Sublayer, Topology,	
	Implementation	
	4.5 Ten-Gigabit Ethernet – Goals, MAC Sublayer, Physical	
	Layer	
	4.6 Backbone Networks -Bus Backbone, Star Backbone	
	4.7 Virtual LANs Membership, IEEE standards advantages	
	4.8 Wireless LAN	
	4.8.1 IEEE 802.11 Architecture,	
	4.8.2 Bluetooth Architecture (Piconet, Scatternet)	
Unit V	Network Devices	6 hrs

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	5.1 Network Connectivity Devices	
	5.1.1 Active and Passive Hubs	
	5.1.2 Repeaters	
	5.1.3 Bridges- Types of Bridges	
	5.1.4 Switches	
	5.1.5 Router	
	5.1.6 Gateways	
Unit VI	Network Security	8 hrs
	6.1 Introduction	
	6.2 Need for Security	
	6.3 Security Services:	
	6.3.1 MessageConfidentiality, Integrity, Authentication, Non	
	repudiation.	
	6.3.2 Entity (User)- Authentication.	
	6.4 Types of Attack	
	6.5 Cryptography, Plaintext, Cipher Text, Encryption,	
	Decryption,	
	Symmetric Key and Asymmetric Key Cryptography	
	6.6 Substitution Techniques, Caesar Cipher, and Transposition	
	Cipher	
	(Problems should be covered.)	
	6.7 Firewalls- Packet Filter firewall, Proxy firewall	
	6.8 Steganography, Copyright	

Suggested Readings/Material:

1. Computer Networks by Andrew Tanenbaum, Pearson Education. [4th Edition]

2. Data Communication and Networking by BehrouzForouzan, TATA McGraw Hill... [4th Edition]

Center for Advanced Studies in Applied Sciences, New Arts, Commerce and Science College, Ahmednagar(Autonomous) Ahmednagar Jilha Maratha Vidya Prasarak Samaj's

New Arts, Commerce and Science College, Ahmednagar (Autonomous) Syllabus B.C.A. Science (Major)

Title of the Course: Laboratory on Advance C Programming								
Year: I			Sem	ester: II				
Course	Course Code	Credit Dist	ribution	Credits	Allotted	Alle	otted N	Iarks
Туре		Theory	Practical		Hours			
						CIE	ESE	Total
SEC-2	BCA-	00	02	02	60	15	35	50
	SCI123P							

Learning Objectives:

1.Secondary data types, such as pointers, strings, structures, unions.

2.Advanced concepts related to functions, such as function pointers and passing variable argument lists to function.

3. To learn about static and dynamic memory allocation.

4.To understand effective use of file handling.

Course Outcomes (Cos)

After Completion of the course the student will be able to:

- 1. Implement Programs with pointers and arrays, perform pointer arithmetic, and
- 2. Efficient use of pre-processor.
- 3. Write programs that perform operations using derived data types.
- 4. Handling of data through files. (text and binary)

Assignment 1	a) Write the Program to implement macros for example:-define				
	constant and array size				
	b) Write the Program to : 1. find maximum of two integers				
	2. check whether a number is positive ,negative or Zero				
	3. check given number is even or odd				
	C)Write the Program to illustrate the use of #pragma				
Assignment 2	a) Write a program to Interchange values of two numbers using				
	pointers				
	b)Write a program to display the elements of an array containing n				
	integers in reverse order				
	using pointer				
	c)Write a program to reverse the elements of an array containing n				
	integers using pointer				
Assignment 3	a) Write a program to multiply two numbers using function pointer				
	b) Write a Program to accept an array and print the same using double				
	pointer				
	c) Write a program to calculate average of array of n numbers . Pass				
	the array to a function and use pointers				

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Assignment 4	a) Write a program to find the number of vowels, consonants, digits
	and white space in a string.
	b) Write a program to accept a word and a string .Remove / delete the
	given word from a string.
	Example: - if word is= "Hello" and the String is "Hello All Well
	Come" The output is:- "All Well Come"
Assignment 5	a) Write a program to compare two strings. If they are not equal
0	display their length and if
	equal concatenate them
	b) Write a program to pass two strings to user defined function and
	copy one string to another
	using pointer
	c) Write a program to reverse string, without using another string
	variabl
Assignment 6	a) Write a program which accepts a sentence from the user and
0	replaces all lower case letters by uppercase letters.
	b) Write a program to find the First Capital Letter in a String. write a
	function iscap() to find the first capital letter.
	c) Write a program to remove all other characters in a string
	except alphabets
	d) Write a program that accepts names of n cities and write functions
	for the following:
	1)Search for a city 2) Display the longest names
Assignment 7	a) Write a program to add two numbers using Command Line
8	Arguments
	b) Write a program to create student structure having fields roll no,
	stud name, mark1, mark2, mark3. Calculate the total and average of
	marks
	c) Write a program to create student employee having field emp id,
	emp name, designation. Pass this entire structure to function and
	display the structure elements
Assignment 8	a) Write a program to declare a structure "employee"(name, age,
0	salary) which contains another structure "address" (house number,
	street) as member variable. Accept the details of one
	employee and display it. (using pointer variable)
	b) Write a program to to store and access "name, subject and
	percentage" for two student.(using union)
	c) Write a program to create a file, read its contents and display on
	screen with each case of character reversed.
Assignment 9	a) Write a program to create a file, read its contents and display on
	screen with each case of character reversed.
	b) Write a program to create a file called emp.rec and store
	information about a person in terms of his name, age and salary.
Assignment 10	Write a program to accept two filenames as command line arguments.
	Copy the contents of
	the first file to the second such that the case of all alphabets is
	reversed.
	26) Write a program to write data of 5 employees to a binary file and
	then read the file.

Center for Advanced Studies in Applied Sciences, New Arts, Commerce and Science College, Ahmednagar(Autonomous) Suggested Readings/Material:

- 1. R.G.Dromey, "How to Solve it by Computer", Pearson Education, India, 2008.
- 2. "C" Programming" Brian W. Kernighan and Denis M. Ritchie.PHI 2nd Edition
- 3. Let us C Yashwant P. Kanetkar, BPB publication
- 4. 21st Century C Ben Klemens OReilly 1st 2012
- 5. E. Balaguruswamy, "Programming in ANSI C", ISBN: 9781259004612, Tata Mc-Graw

Hill Publishing Co Ltd.-New Delhi

Center for Advanced Studies in Applied Sciences, New Arts, Commerce and Science College, Ahmednagar (Autonomous) Ahmednagar Jilha Maratha Vidya Prasarak Samaj's

New Arts, Commerce and Science College, Ahmednagar (Autonomous) Syllabus B.C.A. Science (Major)

Title of the Course: Linux Operating System								
Year: I			Sem	ester: II				
Course	Course Code	Credit Distr	ribution	Credits	Allotted	Alle	otted M	larks
Туре		Theory	Practical		Hours			
						CIE	ESE	Total
VSC-1	BCA-	00	02	02	60	15	35	50
	SCI124P							

Learning Objectives:

- 1. To introduce learners to Linux Operating System
- 2. To understand the Basic commands of Linux Operating System.
- 3 To understand the advanced commands of Linux system.

Course Outcomes (Cos):

The learner will be able

- 1. To run the basic and advanced commands of Linux Operating System.
- 2. To understand the basic components of Linux Operating System.

List of Assignments:

Linux Basic Commands	4
- Write commands to	
• print current working directory	
create directories	
change directory	
• Use of echo, printf, ls, who, date, cal, where is, etc.	
File Handling in Linux	4
- Write commands to	
• Lists all files and directories in the present working	
directory	
• Lists files in sub-directories as well	
• Lists hidden files as well	
• Lists files and directories with detailed information	
like permissions, size, owner, etc.	
• Creates a new file	
• Displays the file content	
• Joins two files (file1, file2) and stores the output in	
 Moves the files to the new location 	
 Renames the file to a new filename 	
 Creates a new directory in the present working 	
• Creates a new unectory in the present working	
 Deletes a directory 	
	 Linux Basic Commands Write commands to print current working directory create directories change directory Use of echo,printf,ls,who,date,cal,whereis,etc. File Handling in Linux Write commands to Lists all files and directories in the present working directory Lists files in sub-directories as well Lists files and directories with detailed information like permissions, size, owner, etc. Creates a new file Displays the file content Joins two files (file1, file2) and stores the output in a new file (file3) Moves the files to the new location Renames the file to a new filename Creates a new directory in the present working directory or a at the specified path Deletes a directory

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	Renames a directory	
Assignment III	User Management in Linux Write commands to • Add User • Update User • Delete User • Create a User group • Set Permissions of Files for user and group	
Assignment IV	 Process Management in Linux Write commands to To display the list of running process To display the detailed list of ongoing processes To Execute a process at a specific time To change the process priority To check the foreground process To check the background process Kill a process 	5
Assignment V	Vi Editor in Linux - Input mode commands - Command mode commands	6
Assignment VI	Shell Programming in Linux - grep - egrep - sort - head - tail - cut - paste	6

Suggested Readings/Material:

- 1. Operating System Concepts Siberchatz, Galvin, Gagne (8th Edition)
- 2. Unix Concepts and Applications., Sumitabha Das., 4th Edition., Tata McGraw Hill
- 3. UNIX and Shell Programming, Behrouz A. Forouzan, Richard F. Gilberg :

Cengage Learning – India Edition. 2009.

4. UNIX & amp; Shell Programming, M.G. Venkatesh Murthy, Pearson Education.

Center for Advanced Studies in Applied Sciences, New Arts, Commerce and Science College, Ahmednagar(Autonomous)