



जा.क./शि.वि/अं.म./ 65

दिनांकः - ०१/०२/२०२५

प्रति,

मा. अधिविभागप्रमुख, कॉम्प्युटर सायन्स अधिविभाग, शिवाजी विद्यापीठ, कोल्हापूर

> विषय: — BCA Part - I अभ्यासकमाबाबत. संदर्भ — या कार्यालयाचे जा.क.SU/BOS/Scie&Tech/538 दिनाक: — २०/०९/२०२४

महोदय,

उपरोक्त संदर्भिय विषयास अनुसररुन आपणास आदेशान्वये कळविण्यात येते की, राष्ट्रीय शैक्षणिक धोरण २०२० नुसार शैक्षणिक वर्ष २०२४–२५ पासून लागू करण्यात आलेल्या BCA Part-I या अभ्यासकमामध्ये किरकोळ दुरुस्ती करण्यात आलेली आहे.

सोबत सदर अभ्यासकमाची प्रत जोडली आहे. तसेच विद्यापीठाच्या <u>https://www.unishivaji.ac.in</u> (NEP-2020@suk/ Online syllabus) या संकेस्थळावर ठेवण्यात आला आहे.

सदर अभ्यासकम सर्व संबधित विद्यार्थी व शिक्षकांच्या निदर्शनास आणून द्यावेत ही विनंती. कळावे.

आपला विश्वास डॉ एम. कबल **उ**पकेलसचिव अभ्यास मंडळ विभाग

सोबत - अभ्यासकमाचीर प्रत,

प्रत :- माहितीसाठी व पुढील योग्यत्या कार्यवाहीसाठी

मा. संचालक, परीक्षा व मुल्यमापन मंडळ	प्र. अधिष्ठाता, विज्ञान व तंत्रज्ञान विद्याशाखा
अध्यक्ष, कॉम्प्युटर सायन्स इंजिनिअरीग ॲण्ड टेक्नॉलाजी, मंडळ	इतर परीक्षा ४ विभागास.
परीक्षक नियुक्ती ए व बी विभागास.	संलग्नता टी. १ व टी. २ विभागास
पीजी प्रवेश विभागास	पीजी सेमिनार विभागास
संगणक केंद्र / आयटी सेल	पात्रता विभागास



SU/BOS/Sci & Tech/ 538

Date: 20/09/2024

То,

The Head, Department of Computer Science, Shivaji University, Kolhapur.

Subject: Regarding syllabus of BCA Part –I (Sem. I & II) degree programme under the Faculty of Science and Technology as per National Educaton Policy, 2020 (NEP2.0).

Sir/Madam,

With reference to the subject mentioned above, I am directed to inform you that the university authorities have accepted and granted approval to the revised syllabi, Nature of Question paper and equivalence of **Bachelor of Computer Applicaion Part-I (Sem - I&II)** degree programme under the Faculty of Science and Technology as per National Educaton Policy, 2020 (NEP 2.0).

This Syllabi shall be implemented from the academic year 2024-25 onwards. A soft copy containing the syllabus is attached herewith and it is available on university website www.unishivaji.ac.in, NEP 2020@suk (Online Syllabus).

The question papers on the pre-revised syllabi of above-mentioned course will be set for the examinations to be held in October/ November 2024 & March / April 2024. These chances are available for repeater students, if any.

You are, therefore, requested to bring this to the notice of all students and teachers concerned.

Thanking you,

Yours (ubal)

Dy. Registrar

Copy to:

opy			
1	The I/c Dean, Faculty of Science & Technology	7	Appointment Section A & B
2	Director, Board of Examinations & Evaluation	8	Affiliation Section (T.1/T.2)
3	The Chairpersan, Respective Board of Studies	9	Eligibility Section
4	B.Sc. Exam Section	10	P.G.Admission Section
5	Computer Centre / I.T. Cell.	11	P.G Seminar Section
6	Internal Quality Assorance Cell		

SHIVAJI UNIVERSITY, KOLHAPUR



NAAC A++ Grade with CGPA 3.52

Multiple Entry and Multiple Exit Option(NEP-2020)

Syllabus for Bachelor of Computer Application

(Under Faculty of Science and Technology)

PART- I SEMESTER- I & II

(Syllabus to be implemented from Academic year 2024-25)

Shivaji University, Kolhapur Bachelor of Computer Application (BCA)

(Under Faculty of Science and Technology)

Program Outcomes

Upon successful completion of the BCA, the student should have met the following Outcomes:

- 1. Appreciate and apply mathematical organization, computing, and domain information for the conceptualization of computing models from clear harms.
- 2. Facility to apply and give expert principles and cyber systems in a universal monetary situation
- 3. Ability to function as an effective communicator and team member through essential skills in multidisciplinary projects.
- 4. Understand, analyze and develop computer programs in the areas related to algorithms, web design, and networking for efficient design of the computer-based system.
- 5. Classify opportunities, private enterprise dreams, and use of original thoughts to build worth and means for the betterment of the human being and the world
- 6. Work in the IT sector as a system engineer, software tester, junior programmer, web developer, system administrator, software developer, etc.
- 7. To develop an interdisciplinary approach among the students

Program Specific Outcome (PSO)

- 1. An ability to enhance the application of knowledge of theory subjects in diverse fields.
- 2. Encouraging students to convert their start-up idea to reality by implementing
- 3. Focuses on preparing the student for roles in computer applications and the IT industry
- 4. Develop programming skills, networking skills, learn applications, packages, programming languages, and modern techniques of IT
- 5. Information about various computer applications and the latest development in IT and communication systems is also provided
- 6. Ability to identify, formulates, analyze and solve problems of programming using different languages.
- 7. Take up self-employment in the Indian & global software market.
- 8. To pursue a career in the corporate sector can opt for M.Sc, MCA.
- 9. The student will be able to know various issues, and the latest trends in technology development and thereby innovate new ideas and solutions to existing problems

1. Introduction

- a) The name of the program shall be Bachelor of Computer Application (BCA).
- b) After completion students will be able to apply standard software engineering practices and strategies in software project development using an open-source programming environment to deliver a quality product for business success.
- c) Job Opportunities: The program addresses the job requirements in many domains such as web development, mobile development, Testing and one involving an assortment of hardware and software.
- d) Many graduates begin their careers as junior programmers and, after some experience, are promoted as system analysts. Others seek an entrepreneurial role in the Information Technology world as independent business owners, software authors, consultants, or suppliers of systems and equipment.
- e) Career opportunities exist in such areas as management software and hardware sales, technical writing, training others on a computer, consulting, software development, and technical support. Application areas in the Information Technology world as independent business owners, software authors, consultants, or suppliers of systems and equipment.
- f) Career opportunities exist in such areas as management software and hardware sales, technical writing, training others on the computer, consulting, software development and technical support. Application areas include transaction processing, accounting functions, sales analysis, games, forecasting and simulation, database management, decision support and data communications.
- g) The present curricula focus on the learning aspect from three dimensions viz. Conceptual Learning, Skills Learning and Practical / Hands-on.

2. Medium of Instruction:

The medium of instruction will be English only

3. Admission Procedure

Admission process is done through Directorate of Technical Education, Mumbai. Institute Choice Code **6038**

4. Eligibility

To be eligible for admission to the Bachelor of Computer Application a candidate must have passed

a) HSC (10+2) from any stream

OR

 b) Three Year Diploma Course (after SSC i.e. 10th Standard), of Board of Technical Education conducted by Government of Maharashtra or its equivalent

5. Course Structure:

Lectures and Practical should be conducted as per the scheme of lectures and practicals indicated in the course structure.

6. Teaching and Practical Scheme

- a) Each contact session for teaching 60 minutes each.
- b) One Practical Batch should be of 30 students.
- c) Practical evaluation should be conducted after the commencement of University examination

7. Project Work:

- a) Project work may be done individually or in groups in case of bigger projects. However if project is done in groups, each student must be given a responsibility for a distinct module and care should be taken to see the progress of individual modules is independent of others.
- b) Students should take guidance from assigned guide and prepare a Project Report on "Project Work" in two copies to be submitted to the Head of the Department.
- c) The project report should contain an Introduction to Project, which should clearly explain the project scope in detail. Also DFDs, ERDs, UML diagrams, database designs and a list of output reports should be included.
- d) The project Work should be of such a nature that it could prove useful or should be relevant from the commercial/Societal angle.
- e) The project report will be duly accessed by the assigned guide and internal marks will be communicated by the Director of the Institute/Head of the Department.
- f) The project report should be prepared in a format prescribed by the University, which also specifies the contents and methods of presentation. IEEE Computer Society templates are recommended in this regard.
- g) The external viva shall be conducted by a panel of minimum two examiners out of which one will be external and other will be internal examiner.

OR

The student shall be allowed to formulate a proposal for startup and the same shall be rated equivalent to project. A detailed problem statement showing innovation along with marketability, business plan and cash flow shall be part of the evaluation criteria.

8. Assessment

- 1. The project will be evaluated by the university appointed examiners both internal as well as external.
- 2. The final practical examination will be conducted by the university appointed

examiners both internal as well as external at the end of semester for each lab course and marks will be submitted to the university by the panel.

- 3. The practical examination will be conducted semester wise in order to maintain the relevance of the respective theory course with laboratory course.
- 4. The final examinations shall be conducted at the end of the semester.

5. Nature of question paper:

Nature of question paper is as follows for University end semester examination

Theory Examination:

Each paper will carry 40 Marks

- 1. Question No.1 is compulsory and is of multiple choice questions. There will be 8 multiple choice questions each carrying 1 mark
- 2. Question No.2 will have 3 questions out of which 2 questions need to be solved. Each carries 8 Marks
- 3. Question No.3 will have 6 questions out of which 4 questions need to be solved. Each carries 4 Marks

Practical Examination:

- 1. Each paper carries 50 Marks
- 2. Duration of Practical Examination: 2 Hrs
- Nature of Question paper: There will be three questions out of which any two questions to be attempted and each question carries 20 Marks.
- 4. Journal carries 10 Marks

9. Standard of Passing:

1. Minimum 35% in each subject. There shall be separate passing for theory and practical.

ATKT rules

1. Admission to BCA Part II is allowed even if the student fail in 20 subject of BCA I

2. Admission to BCA Part III is allowed even if student fail in 20 subjects of BCA II but they must have cleared all the subjects of BCA I

10.Board of Paper Setters /Examiners:

For each Semester end examination there will be a board of Paper setters and examiners for every course. While appointing paper setter /examiners, care should be taken to see that there is at least one person specialized in each unit of the course.

11.Credit system implementation:

As per the University norms

12.Clarification of Syllabus:

The syllabus committee should meet at least once in a year to study and clarify any difficulties from the Institutes.

13.Eligibility of Faculty:

MCA (from any faculty) or M.Sc. (Computer Science) or M. Tech.(CS) with at least B+ or equivalent

14. Revision of Syllabus:

As the computer technology experience rapid rate of obsolescence of knowledge, revision of the syllabus should be considered every two/three years.

15.Fees Structure: 18000/- (Tuition Fees) + other fees as approved by the Shivaji University

fee fixation committee

16. Intake Capacity: 60

17.Award of Class:

There will be numerical marking on each question. At the time of declaration of the result the marks obtained by the candidate is converted into grade point as shown below;

Grade Point Table

Grading: Shivaji University has introduced a Seven-point grading system as follows:

Sr. No.	Marks Range out of 50	Grade Point	CGPA	Letter grade
1.	43-50	10	9.50-10.00	O: Outstanding
2.	38-42	9	8.50-9.49	A+:Excellent
3.	33-37	8	7.50-8.49	A:Very Good
4.	28-32	7	6.50-7.49	B+:Good
5.	23-27	6	5.50-6.49	B: Average
6.	18-22	5	4.50-5.49	C:Satisfactory
7.	0-17	0	0.0-4.49	F:Fail
8.	Absent	0		

BCA Part I Semester I & II Multiple Entry and Multiple Exit Option (NEP-2020) Syllabus to be implemented from Academic Year 2024-25

- 1. Title: BCA
- 2. Year of implementation: Syllabus will be implemented from June 2024 onwards
- 3. Duration: BCA Part- I. The duration of course shall be one year (Two semesters).
- 4. Pattern: Pattern of examination will be semester
- 5. Structure of Course:

Multiple Entry and Multiple Exit Option (NEP-2020) BCA Program Structure BCA Part - I (Level-4.5)

SEMESTER-I (Duration- Six Month)										
Sr.	Course Code	Teachin	hing Scheme Examination Scheme							
No.		Theory and Practical University			Internal Assessment (IA)		ent (IA)			
				Assessment (UA)						
		Lecture s (Per week)	Hours (Per week)	Credit	Maxi mum Mark s	Minim um Marks	Exa m minu tes	Maxim um Mark s	Minimu m Marks	Exam. Minutes
1	Subject I DSC I: Basics of C	2	-	2	40	14	90	10	04	10
2	Subject I DSC II: Fundamentals of Operating System	2	-	2	40	14	90	10	04	10
3	Subject I Practical I: Practical based on Subject I DSC I	-	4	2	40	14	90	10	04	-
4	Subject II DSC I: Foundation of Mathematics	2	-	2	40	14	90	10	04	10
5	Subject II DSC II: Linear Data Structure	2	-	2	40	14	90	10	04	10
6	Subject II Practical I: Practical based on Subject II DSC II	-	4	2	40	14	90	10	04	-
7	Subject III DSC I: Fundamentals of digital Electronics	2	-	2	40	14	90	10	04	10
8	Subject III DSC II: Data Communication	2	-	2	40	14	90	10	04	10
9	Subject III Practical I: Practical based on Subject III DSC I & Subject III DSC II	-	4	2	40	14	90	10	04	-
10	OE I: Office Automation-I	-	4	2	40	14	90	10	04	10
11	IKS I: Vedic Mathematics	2	-	2	40	14	90	10	04	10
	Total (A)			22	440			110		

	SEMESTER-II (Duration- Six Month)									
Sr.	Course Code	Teaching S	cheme		Examina	tion Sc	heme			
No.		Theory and	Practical		Universit	y Ass	sessment	Internal	Assess	sment
					(UA)			(IA)		
		Lectures (Per week)	Hours (Per week)	Credit	Maximu m Marks	Mini mum Mark s	Exam minut es	Maximu m Marks	Minimu m Marks	Exa m. Min utes
1	Subject I DSC III: Advanced C	2	-	2	40	14	90	10	04	10
2	Subject I DSC IV: System Analysis and Design	2	-	2	40	14	90	10	04	10
3	Subject I Practical II: Practical based on Subject I DSC III	-	4	2	40	14	90	10	04	-
4	Subject II DSC III: Discrete Mathematics	2	-	2	40	14	90	10	04	10
5	Subject II DSC IV: Non Linear Data Structures	2	-	2	40	14	90	10	04	10
6	Subject II Practical II: Practical based on Subject II DSC IV	-	4	2	40	14	90	10	04	-
7	Subject III DSC III: Computer Architecture	2	-	2	40	14	90	10	04	10
8	Subject III DSC IV: Basics of Networking	2	-	2	40	14	90	10	04	10
9	Subject III Practical II: Practical based on Subject III DSC III and Subject III DSC IV	-	4	2	40	14	90	10	04	-
10	OE II: Office Automation-II	-	4	2	40	14		10	04	10
11	VEC I: Democracy, Election and Constitution	2	-	2	40	14	90	10	04	10
	Total (B)			22	440			110		
	Total (A+B)			44	880			220		

• Student contact hours per week : 24	Total Marks for		
Hours (Min.)	BCA-I: 1100		
• Theory and Practical Lectures : 60 Minutes Each	Total Credits for B.C.A-I (Semester I & II) : 44		
 RM: Research Methodology OJT: On job training Internship:	 Practical Examination is Semester wise before		
Student must complete on job training/	theory Examination. Separate passing is mandatory for Theory,		
Internship during summer break.	Internal and PracticalExamination		
• Requirement for Entry at Level 4.5: Completed all requirements of the 10+2			

• Exit Option at Level 4.5: Students can exit after Level 4.5 with under certificate course in Computer Programming if he/she completes the coursesequivalent to minimum of 44 credits and an additional. 4 credits core NSQF course/Internship.

Course code	: Subject I DSC I		
Title of course	: Basics of C		
Theory	: 30		
Marks	: 50		
Credit	: 02		

Course Outcomes:

The course will enable students to;

- 1. Make the student learn a programming language
- 2. Develop logics which will help them to create programs, applications in C
- 3. Switch over to any other language in future

UNIT I

(15 HOURS)

Introduction to the C Language – Algorithm, Pseudo code, Flow chart, Background, C Programs, Identifiers, Data Types, Variables, Constants, Input / Output, Operators(Arithmetic, relational, logical, bitwise etc.), Expressions, Precedence and Associatively, Expression Evaluation, Type conversions, Program execution phases, format specifiers.

UNIT II

(15 HOURS)

Statements: Selection Statements (making decisions) –if and switch statements, Repetition statements (loops)-while, for, do-while statements, Loop examples, other statements related to looping – break, continue, go to, ternary operators. Arrays: Basic concepts, one-dimensional arrays, two–dimensional arrays, multidimensional arrays, C programming examples Pointers – Introduction (Basic Concepts), pointers to pointers, compatibility, Pointer Applications, Arrays and Pointers

- 1. Let Us C by Yashavant Kanetkar
- 2. C: The Complete Reference by Herbert Schildt
- 3. 'C' Programming in an Open Source Paradigm: A Hands on Approach by K.S.Oza, S.R.Patil and R.K.Kamat

Course code: Subject I DSC IITitle of course: Fundamentals of Operating SystemTheory: 30Marks: 50Credit: 02

Course Outcomes:

After completion of this course students will be able to;

- 1. Understand fundamental operating system
- 2. Learn types of operating systems, Scheduling
- 3. Learn Process Synchronization, Deadlock Prevention, and Avoidance

UNIT I

(15 HOURS)

Evolution of Operating Systems: Introduction, Types of operating systems, Computer System Organization, Architecture, Structure, Operations, Process Management, Memory Management, Storage Management, Kernel Data Structures, Computing Environments. Operating System Structures: Services, System Calls, Types, Operating System Structure, System Boot. Processes: Process Concept, Scheduling, Operations, Interprocess Communication. Multithreaded Programming: Multicore Programming, Multithreading Models.

UNIT II

(15 HOURS)

Process Synchronization: The Critical-Section Problem, Peterson's Solution, Synchronisation Hardware, Mutex Locks, Semaphores, Classic Problems of Synchronization, Monitors, Synchronization Examples. Process Scheduling: Criteria, Scheduling Algorithms, Multi-Processor Scheduling, Real-time CPU Scheduling. Deadlocks: System model, Characterization, Methods for handling deadlocks, Deadlock Prevention, Avoidance, Detection and Recovery from deadlock.

- William Stallings, "Operating Systems-Internals and Design Principles", Pearson, IX Edition, 2018
- D M Dhamdhere: Operating Systems A Concept Based Approach, III Edition, Tata McGraw – Hill, 2015.

Course code	: Subject I Practical I
Title of course	: Practical based on Subject I DSC I
Practical	: 30
Marks	: 50
Credit	: 02

Course Outcomes:

After completion of this course students will be able to;

- 1) To make the student learn a programming language.
- 2) To learn problem solving techniques.
- 3) To teach the student to write programs in C and to solve the problems

Lab work is based on C Programming Language. This laboratory course will consist of 25 to 30. Programming exercises with focus on Arrays, Pointers.

: Subject II DSC I
: Foundation of Mathematics
: 30
: 50
: 02

Course Outcomes:

The course will enable students to;

- 1. Basic knowledge of set theory, functions and relations concepts, matrix needed for designing and solving problems.
- 2. Construct simple mathematical proofs and possess the ability to verify them.

UNIT I

(15 HOURS)

SETS: Introduction, Methods of describing of a set: Tabular form, Set builder form, Finite set, Infinite set, Empty set, Subset, Universal set, Equal sets, Disjoint sets, Complementary set, Operation on Sets: Union of sets, Intersection of sets, Difference of sets, Examples, De Morgan's Laws (without proof), Venn diagram, Examples, Cartesian product of two sets, Examples, Idempotent laws, Identity laws, Commutative Laws, Associative laws, Distributive laws, Inverse laws, Involution laws, Duality, Computer Representation of sets and its operations, Relations and Functions: Introduction, Operations on Functions, Injective, surjective and bijective functions.

UNIT II

(15 HOURS)

Logic: Introduction, Definition: Statement (Proposition), Types of Statements: Simple and compound statements, Truth values of a statement, Truth Tables and construction of truth tables, Logical Operations: Negation, Conjunction, Disjunction, Implication, Double Implication, Equivalence of Logical statements, Converse, Inverse and Contra positive, Statement forms: Tautology, Contradiction, and Contingency, Duality, Laws of logic: Idempotent laws, Commutative laws, Associative laws, Identity laws, Involution laws, Distributive laws, Complement laws, De Morgan's laws, Argument: Valid and Invalid arguments, Examples based on above.

- 1. Discrete Mathematics & Structures by Satinder Bal Gupta
- 2. Fundamental Approach to Discrete Mathematics by D. P. Acharjya, Sreekumar
- 3. Discrete Mathematical Structures by Kolman, Busby, Ross

Multiple Entry and Multiple Exit Option (NEP-2020) BCA PART I SEM I

Course code	: Subject II DSC II
Title of course	: Linear Data Structure
Theory	: 30
Marks	: 50
Credit	: 02

Course Outcomes:

The course will enable students to;

- 1. Apply linear data structures to solve real-world problems efficiently and effectively.
- 2. Understand the fundamental concepts of linear data structures such as arrays, linked lists, stacks, and queues.

UNIT I

Definition, data structure operations. Algorithms: Complexity, Time Space tradeoff, Complexity of Algorithms, Asymptotic Notations for Complexity of Algorithms, Sub algorithms, Variables, data. Arrays, Linked Lists, Stacks and Queue Introduction, Linear arrays, Representation of linear arrays in memory, Address calculation of using row and column major ordering, Traversing linear arrays, Inserting and Deleting, Multidimensional arrays: Representation of Two-Dimensional arrays in memory, Pointers: Pointers arrays, Matrices, Sparse Matrices.

UNIT II

Linear Lists: Linked Lists, Representation of Linear Lists in memory, Traversing a Linked List, Searching a linked List, Memory allocation: Garbage collection, overflow and underflow, Insertion into a linked list, Deletion from linked list, Circular linked lists, Doubly linked lists, Header linked lists. Stacks and Queue Stacks: Definition, Array representation of stacks, Linked representation of stacks, Polish notation, Evaluation of a Postfix Expression, Transforming Infix Expressions into Postfix Expressions. Queues: Definition, Array representation of Queues, Linked representation of Queues, Circular queues, Priority Queue and D-Queue.

Reference Book:

1. Robert Kruse, C.L Tondo and Bruce Leung, "Data Structure and Programming in C", Pearson Education.

2. Yedidyah Langsam, Moshe J. Augenstein, and Aaron M. Tenenbaum, "Data Structure using C and C++", Pearson Education 2nd Edition.

(15 HOURS)

(15 HOURS)

Course code	: Subject II Practical I
Title of course	: Practical based on Subject II DSC II
Practical	: 30
Marks	: 50
Credit	: 02

Course Outcomes:

The course will enable students to;

- 1. Write and execute programs to manipulate array data structures effectively.
- 2. Implement and perform insertion, deletion, and traversal operations on linked lists.

This laboratory course will consist of 25 to 30. Programming exercises with focus on covering practical aspects and hands-on exercises focusing on key linear data structures such as arrays, linked lists, stacks, and queues.

Multiple Entry and Multiple Exit Option (NEP-2020) BCA PART I SEM I

Course code	: Subject III DSC I
Title of course	: Fundamentals of Digital Electronics
Theory	: 30
Marks	: 50
Credit	: 02

Course Outcomes:

After completion of this course students will be able to;

- 1. Understand the concept of number system
- 2. Understand the functionality of logic gates

UNIT I

(15 HOURS)

Number Systems: Introduction to Decimal, Binary, Hexadecimal Number System Interconversion from one system to Another (examples),code, Gray code, Exess-3 code, ASCII cod e, EBCDIC code ,Concept of parity bit ,Signed and unsigned numbers representation ,1's & 2's co mplement of binary numbers, 9's complement and binary arithmetic,Hamming code for error correc tion & detection

UNIT II

(15 HOURS)

Logic Gates: AND, OR, NOT, NOR, NAND, EX-OR (Symbol, Expression and Truth Table), Application of EX-OR gate , Boolean algebra and identities ,De Morgan's theorem and Inter conver sion of logic Gates (NAND and NOR),Simplifications of logic expressions using : Boolean algebra, K map with examples, Introduction to logic families(TTL, ECL, CMOS), TTL NAND gate & CMOS NOT gate, Input output parameters Logic levels, switching speed, propagation delay, power dissipation, noise margins and fan in-out of TTL and CMOS, Tristate logic (inverter & buffer)

- 1. Digital Fundamentals by Morris and Mano, PHI Publication
- 2. Fundamental of digital circuits by A.Anandkumar, PHI Publication
- 3. Digital Fundamentals by Floyd & Jain, Pearsons Pub
- 4. Fundamentals of Logic Design by Charles H. Roth Thomson

Course code	: Subject III DSC II
Title of course	: Data Communication
Theory	: 30
Marks	: 50
Credit	: 02

Course Outcomes:

After completion of this course students will be able to;

1. Understand basic taxonomy and terminology of the computer networking

2. Understand the propagation modes, Flow Control.

UNIT - I

(15 HOURS)

Introduction: Data Communication: components – Networks: distributed processing, network criteria – Protocols and Standards. Basic Concepts: Line Configuration – Topology: Mesh, Star, Tree, Bus, Ring – Transmission Mode – Categories of Networks: LAN, MAN, WAN– Internet works. The OSI Model: The Model – Functions of the Layers. Transmission of Digital Data: Digital data transmission: Parallel, Serial – DTE-DCE interface: EIA 232 interface: mechanical, electrical and Functional Specification, Null modem – MODEMS. Transmission media:

UNIT - II

(15 HOURS)

Guided media: twisted pair cable, coaxial cable and fiber optic cable: propagation modes –Unguided media: propagation of radio waves, terrestrial microwave, satellite communication, cellular telephony – Transmission impairment: attenuation, distortion, noise –performance: throughput, propagation speed, propagation time. Data Link Control: Line Discipline: ENQ/ ACK, Poll/Select - Flow Control: Stop-and- wait, Sliding Window – Error Control: Stop and wait ARQ, Sliding Window ARQ: Go-back-n and Selective reject.

References:

1. Behrouz A. Forouzan. Data Communications and Networking. Tata McGraw-Hill Edition, Fourth Edition.

2. Andrews. Tanenbaum Computer Networks. Pearson Education . Fourth Edition.

Course code	: Subject III Practical I
Title of course	: Practical based on Subject III DSC I & Subject III DSC II
Practical	: 30
Marks	: 50
Credit	: 02

Course Outcomes:

The course will enable students to;

- 1. Understanding Analog and Digital Signals
- 2. Demonstrating Data Transmission over Different Media (Coaxial Cable, Fiber Optic, etc.)

This laboratory course will consist of 25 to 30 exercises with focus on covering practical aspects of Converting between Binary, Decimal, Hexadecimal, and Octal Systems, Implementing Half Adder and Full Adder Circuits. Implementing Basic Logic Gates (AND, OR, NOT, NAND, NOR, XOR, XNOR).

Course code	: OE 1
Title of course	: Office Automation-I
Practical	: 30
Marks	: 50
Credit	: 02

Course Outcomes:

After completion of this course students will be able to;

- 1. Understand the basics of MS Word.
- 2. Understand the working of PowerPoint.

UNIT I

(15 HOURS)

MS Word: Working with Documents -Opening; Saving files, Editing text documents, Formatting page & amp; setting Margins, Formatting Documents - Setting Font styles, Font selection- style, size, colour etc, Type face - Bold, Italic, Underline, Case settings, Highlighting, Special symbols, Setting Paragraph style, Alignments, Indents, Line Space, Margins, Bullets, Numbering. Setting Page style Creating Tables- Table settings, Borders, Alignments, Insertion, deletion, Merging, Splitting, Sorting, and Formula, Drawing - Inserting ClipArts, Pictures/Files etc.

UNIT II

(15 HOURS)

MS Power point: Introduction to presentation – Opening new presentation, Different presentation templates, setting backgrounds, selecting presentation layouts. Creating a presentation, Setting Presentation style, Adding text to the Presentation. Formatting a Presentation- Adding style, Colour, gradient fills, Arranging objects, Adding Header Footer, Slide Background, Slide layout. Adding Graphics to the Presentation- Inserting pictures, movies, tables etc into presentation, Adding Effects to the Presentation- Setting Animation transition effect.

Reference Books:

- 1. Microsoft Word 2010: Level 2, by Judy Mardar and Pamela R. Toliver
- 2. Excel 2016 Bible 1st Edition by John Walkenbach.
- 3. PowerPoint For Dummies, Office 2021 Edition 1 st Edition by Doug Lowe
- 4. Introduction to Information Technology Alexis Leon, Mathews Leon, and

Leena Leon, Vijay Nicole Imprints Pvt. Ltd., 2013.

Multiple Entry and Multiple Exit Option (NEP-2020) BCA PART I SEM I

Course code	: IKS I
Title of course	: Vedic Mathematics
Theory	: 30
Marks	: 50
Credit	: 02

Course Outcomes:

- 1. By successfully completing this course, the learner will be able to:
- 2. Perform simple arithmetic calculations with speed and accuracy
- 3. Will be able to generate tables of any number

UNIT I

(15 HOURS)

Introduction to Vedas, History of Vedas, History and Evolution of Vedic Mathematics Introduction of Basic Vedic Mathematics, Techniques in Multiplication, Special Case, Tables etc. Various techniques to carry out basic operations covering Addition, Subtraction, Multiplication, Division, Complements and Bases, Vinculum number. Comparison of Standard Methods with Vedic Methods

UNIT II

(15 HOURS)

General multiplication (Vertically Cross- wise), Multiplications by numbers nearbase. Verifying answers by use of digital roots, Divisibility tests, Division of numbers near base, Comparison of fractions.Different methods of Squares (General method, Basemethod, Duplex method etc.)Cubes, Cube roots, Square Roots, General division.Quadratic Equations, Simultaneous Equations, Use of various Vedic Techniques for answering numerical aptitude questions from Competitive Examinations

- 1. Bhatiya Dhaval, Vedic Mathematics Made Easy, Jaico Publishing House
- 2. Thakur Rajesh Kumar, Vedic Mathematics for students taking Competitive Examinations

Multiple Entry and Multiple Exit Option (NEP-2020) BCA PART I SEM II

: Subject I DSC III
: Advanced C
: 30
: 50
: 02

Course Outcomes:

The course will enable students to;

- 1. To impart knowledge in creating and using Arrays of the C data types.
- 2. Write programs that perform operations using derived data types

UNIT I

(15 HOURS)

Functions: Introduction to Structured Programming, Functions- basics, user defined functions, inter function communication (call by value, call by reference), Standard functions. Storage classes, arrays to functions, recursive functions, example C programs. Structures, Union, Preprocessor

UNIT II

(15 HOURS)

Strings: Concepts, C Strings, String Input / Output functions, string manipulation functions, string /data conversion. Input and Output – Concept of a file, streams, text files and binary files, Differences between text and binary files, State of a file, Opening and Closing files, file input / output functions (standard library input / output functions for files), file status functions (error handling), Positioning functions.

- 1. Let Us C by Yashavant Kanetkar
- 2. C: The Complete Reference by Herbert Schildt
- 3. 'C' Programming in an Open Source Paradigm: A Hands on Approach by K.S.Oza, S.R.Patil and R.K.Kamat

Multiple Entry and Multiple Exit Option (NEP-2020) BCA PART I SEM II

: Subject I DSC IV
: System Analysis and Design
: 30
: 50
: 02

Course Outcomes:

- 1. Define and use common System Analysis and Design fundamental terminology.
- 2. Utilize current Analysis and Design tools to graphically characterize processes and flows in a business system

UNIT I

(15 HOURS)

Basic Concept of Systems: Definition and Concepts; Elements of a System: Input, Output Processor, Control, Feedback, Environment, Boundaries and Interface; Characteristics of a System; Types of systems -Physical and Abstract System, Open and Closed Systems, Man-made Systems; Information and its categories. System Analysis: Fact Finding Techniques: Interview - Questionnaire - Record Review - Observation. Systems Analysis: Analyzing Systems Data - Feasibility Study: Technical, Economical and Operational - Steps in Feasibility Analysis, Feasibility Report, Oral Presentation

UNIT II

(15 HOURS)

System Analyst -Role of a System Analyst, Introduction to System Design – Comparison between System Analysis and System Design. Analysis Tools: Data Flow Concept - Data Flow Diagram Data Dictionary-Decision Table -Decision Tree .System Development Life Cycle -Problem Definition -Feasibility Study -Analysis -Design -Development -Implementation -Post Implementation and Maintenance. Data Flow Diagram and System Prototype Design -Meaning and Significance of Data flow diagram(DFDs)-Symbols used in DFDs -Rules for Constructing DFDs -Introduction and comparison between Physical and Logical DFDs

Reference Books:

1. S. Parthasarthy & amp; B. W. Khalkar : System Analysis & amp; Design, 1st Edition, Master Ed. Cons., Nashik

2. James A. Senn : Analysis & amp; Design of Information System 2nd Edition, McGraw-Hill Int

3. V.Rajaraman – Analysis & amp; Design of I. S. Printice Hall of India Private Ltd.2003

Multiple Entry and Multiple Exit Option (NEP-2020) BCA PART I SEM II

Course code	: Subject I Practical II	
Title of course	: Practical based on Subject I DSC III	
Practical	: 30	
Marks	: 50	
Credit	: 02	

Course Outcomes:

After completion of this course students will be able to;

- 1. Manage I/O operations in your C program
- 2. Repeat the sequence of instructions and points for a memory location
- 3. Understand the basics of file handling mechanisms

Lab work is based on Advanced C Programming Language especially focusing on functions and file handling. This laboratory course will consist of 25 to 30 Programming exercises with focus on Strings, call by value, call by reference.

Multiple Entry and Multiple Exit Option (NEP-2020) BCA PART I SEM II

Course code	: Subject II DSC III
Title of course	: Discrete Mathematics
Theory	: 30
Marks	: 50
Credit	: 02

Course Outcomes:

After completion of this course students will be able to;

- 1. Understand the fundamental concepts of discrete mathematics, including logic.
- 2. Understand functions, and counting principles.

UNIT I

(15 HOURS)

Counting Principles Functions: Definition, Types of mapping, Injective, Surjective Bijective functions, Inverse function, Composition of functions. Counting: Addition; Multiplication principle, Permutation and Combination. Cardinality of finite set. Cardinality of union of sets (Addition principle). Principle of Inclusion and Exclusion. Examples. Combinatorial Arguments. Pigeonhole Principle (Statement only)

UNIT II

(15 HOURS)

Recurrence Relation Logic. Recurrence Relation Introduction. Linear Recurrence relation with constant coefficient. Homogeneous solutions and Examples. Particular and Total Solution, Examples. Logic Propositions and Logical connectives: Definition, Types of Propositions, Truth values and Truth Tables, Tautology and Contradiction, Logical equivalence. Rules of inferences. Valid arguments and proofs. Methods of Proofs: Direct and indirect Examples.

- 1. Discrete mathematics by S. R. Patil and others, NIRALI Prakashan.
- 2. Discrete mathematics by Bhopatkar, Nimbkar, Joglekar, Vision Publication

Course code	: Subject II DSC IV	
Title of course	: Non Linear Data Structures	
Theory	: 30	
Marks	: 50	
Credit	: 02	

Course Outcomes:

After completion of this course students will be able to;

1. Understand concepts and characteristics of non-linear data structures, such as trees, graphs

2. Understand Sorting and Searching

UNIT I

(15 HOURS)

Trees- Introduction and Definition of Trees, Tree Terminology, Binary Tree, Representing Binary Tress in Memory, Traversing Binary Tree: Preorder, In-order, Post-ordered traversal, Traversal algorithms using stacks, Headed nodes: Threads (definition only), Binary Search trees, Searching and Inserting in Binary Search trees, Deleting in a Binary search tree. AVL trees, m-trees and B-Trees (definition only).

UNIT II

(15 HOURS)

Graphs-. Introduction, Graph theory terminology: Graph and multi graphs. Directed Graphs, Sequential representation of graphs: Adjacent matrix, Path matrix, Linked representations of a Graph, Operations on Graphs: Searching in a Graph, Inserting in a graph, Traversing a graph : Breadth- First search, Depth Final search, Spanning tree (definition only).Sorting and Searching. Sorting, Bubble Sort, Insertion sort, Quick Sort, Selection sort, Merging, Merge-sort. Searching: Sequential and binary searches, Indexed search, Hashing Schemes

References:

- 1. Alfred V Aho, John E Hopcroft and Jeffery D Ullman, "Data Structures and Algorithms", Pearson Education.
- 2. Samiran Chattopadhyay, Debabrata Ghosh Dastidar and Matagini Chattopadhyay, "Data Structures through C Language", BPB Publication.

Course code	: Subject II Practical II
Title of course	: Practical based on Subject II DSC IV
Practical	: 30
Marks	: 50
Credit	: 02

Course Outcomes:

After completion of this course students will be able to;

- 1. Understand and describe the fundamental concepts and characteristics of non-linear data structures, including trees and graphs.
- 2. Write and execute programs to create, traverse, and manage various tree data structures.

This laboratory course will consist of 25 to 30 programs with focus on covering the hands-on aspects of Develop programs to implement graph algorithms, such as depth-first search (DFS)

: Subject III DSC III
: Computer Architecture
: 30
: 50
: 02

Course Outcomes:

After completion of this course students will be able to;

- 1. Study structure, function, and design of computer systems.
- 2. Study Logic gates, Machine Instruction

UNIT I

(15 HOURS)

Binary Systems and Combinational Logic, Digital Computers and Digital Systems, Binary Numbers, Number Base Conversion, Octal and Hexadecimal Numbers, subtraction using r's and r-1complements, Binary Code, Binary Storage and Registers, Binary Logic, Integrated Circuits. Axiomatic Definition of Boolean Algebra, Basic Theorems and Properties of Boolean Algebra, Boolean Functions, Canonical and Standard Forms, Other Logic Operations, Digital Logic Gates, The map Method, Two – and Three – Variable Maps, Four – Variables Map **UNIT II**

(15 HOURS)

Arithmetic Circuits and Sequential Logic, Logic gates NAND and NOR Implementation, Other TwoLevel Implementations, Introduction, Adders, Subtractors, Binary Parallel Adder, Decimal Adder, Magnitude Comparator, Decoders, Multiplexers, BOOTH algorithm for signed numbers with example. Sequential Logic: Introduction, different types of Flip - Flops, Triggering of Flip-Flops, Boolean algebra, combinational circuits, circuit simplification, sequential circuits Machine Instruction: Memory Locations and Addresses, Memory Operations, Instructions and Instruction Sequencing, Addressing Modes

REFERENCES:

- 1. Computer Organization and Design: The Hardware/Software Interface" by David A. Patterson and John L. Hennessy
- 2. Computer Organization and Architecture: Designing for Performance" by William Stallings

Course code: Subject III DSC IVTitle of course: Basics of Networking

Theory	: 30
Marks	: 50
Credit	: 02

Course Outcomes:

After completion of this course students will be able to;

1. Study protocols and Local Area Networks

2. Study the concepts of switching, Presentation layer and Session Layer paradigms

UNIT I

(15 HOURS)

Local Area Networks: Ethernet: 10BASE5, 10BASE2, 10BASE-T, IBASE5, Other Ethernet networks –Token Bus –Token Ring - FDDI. UNIT -IV 15 HRS Switching: Circuit Switching: Space division switching, Time division switches –Packet Switching: datagram approach, Virtual Circuit approach –Message Switching. Integrated Services Digital Network: B, D, and H channels, User Interfaces, Functional Grouping-The ISDN Layers – Broadband ISDN.

UNIT II

(15 HOURS)

Transport Layer: Duties of the Transport Layer: End-to end delivery, Addressing, Reliable delivery, Flow control, Multiplexing – Connection – The OSI Transport Protocol: transport classes, TPDU, Connection- oriented and connectionless services. Upper OSI Layers: Session Layer: Session and Transport Interaction, Synchronization points, Session Protocol data Unit – Presentation Layer- Functions:Translation, Encryption/ Decryption, Authentication, Compression – Application Layer: MHS, FTAM, VT, DS, CMIP

REFERENCES:

1. Behrouz A. Forouzan. Data Communications and Networking. Tata McGraw-Hill Edition

2. Andrew s. Tanenbaum .Computer Networks. Pearson Education

Course code	: Subject III Practical II
Title of course	: Practical based on Subject III DSC III & Subject III DSC IV
Practical	: 30
Marks	: 50
Credit	: 02

Course Outcomes:

After completion of this course students will be able to;

- 1. Configuring IP Addresses and Subnets
- 2. Understanding and Testing Network Connectivity

This laboratory course will consist of 25 to 30 programs. Exercises with focus on covering the hands-on aspects of Configuring IP Addresses and Subnets, Understanding and Using Common Protocols (HTTP, FTP, SMTP, DHCP).

Course code	: OE II
Title of course	: Office Automation-II
Practical	: 30
Marks	: 50
Credit	: 02

Course Outcomes:

After completion of this course students will be able to;

- 1. Understand the functionalities of MS Excel
- 2. Improve writing skills in different format

UNIT I

(15 HOURS)

Introduction to Excel, Personalising Excel, Understanding and Using Basic Functions, Text Functions, Arithmetic Functions Proofing and Formatting, Protecting Excel- Excel Security, Printing Workbooks, Advance Paste Special Techniques, Time and Date Functions, Filtering and Sorting, Printing Workbooks.

UNIT II

(15 HOURS)

What-If Analysis, Data Validation, Logical Analysis, Lookup Functions, Arrays Functions, Pivot Tables, Excel Dashboard, Slicers and Charts, VBA Macro, Introduction to VBA, Variables in VBA, Input box and Message Box Functions, If and select statements, Looping in VBA, Worksheet / Workbook Operations, Mail Functions – VBA

- 1. Excel 2016 Bible, by John Walkenbach
- 2. Excel: Quick Start Guide from Beginner to Expert, by William Fischer
- 3. Mastering Advanced Excel Paperback 21 July 2023 by Ritu Arora

Course code	: VEC I
Title of course	: Democracy, Election and Constitution
Theory	: 30
Marks	: 50
Credit	: 02

Syllabus as per University