ಹಾಸನ ವಿಶ್ವವಿದ್ಯಾಲಯ

ಸ್ಥಾಪನೆ–2023

ಹೇಮಗಂಗೋತ್ರಿ ಹಾಸನ–573226

ವಿಶ್ವವಿದ್ಯಾಲಯ ಕಾರ್ಯಾಲಯ

ದೂರವಾಣಿ ಸಂಖ್ಯೆ :–08172–220015 ಇ–ಮೇಲ್ :reg.hassan.uni@gmail.com

ಕಡತ ಸಂಖ್ಯೆ : ಸಿ ಆರ್–05/ಬಿ.ಓ.ಎಸ್/2026-27 ದಿನಾಂಕ: 21.07.2026

ಅಧಿಸೂಚನೆ

ವಿಷಯ:2026–27ನೇ ಶೈಕ್ಷಣಿಕ ಸಾಲಿನ ಸ್ನಾತಕ ಪದವಿಯ **ಒಂದು ಮತ್ತು ಎರಡನೇ** ಸೆಮಿಸ್ಟರ್‌ನ Computer Science- BCA ವಿಷಯದ ಪಠ್ಯಕ್ರಮವನ್ನು ಪರಿಷ್ಕರಿಸಿರುವ ಬಗ್ಗೆ

ಉಲ್ಲೇಖ:1.ದಿನಾಂಕ. 02.05.2026 ರಂದು ಜರುಗಿದ Computer Science- BCA ಅಧ್ಯಯನ ಮಂಡಳಿ ಸಭೆಯ ತೀರ್ಮಾನ.

2.ದಿನಾಂಕ 16.07.2026 ರಂದು ಜರುಗಿದ ವಿದ್ಯಾವಿಷಯಕ ಪರಿಷತ್ ಸಭೆಯ ತೀರ್ಮಾನ.

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ದಿನಾಂಕ 02.05.2026 ರಂದು ನಡೆದ Computer Science- BCA ಅಧ್ಯಯನ ಮಂಡಳಿಯು ಸ್ನಾತಕ ಪದವಿಯ ಒಂದು ಮತ್ತು ಎರಡನೇ ಸೆಮಿಸ್ಟರ್‌ನ Computer Science- BCA ವಿಷಯಕ್ಕೆ ಸಂಬಂಧಿಸಿದಂತೆ ಪರಿಷ್ಕೃತ ಪಠ್ಯಕ್ರಮವನ್ನು 2026–27ನೇ ಶೈಕ್ಷಣಿಕ ವರ್ಷದಿಂದ ಜಾರಿಗೊಳಿಸಲು ಶಿಫಾರಸ್ಸು ಮಾಡಿರುತದೆ.

ಉಲ್ಲೇಖಿತ 1 ಮತ್ತು 2ರಲ್ಲಿ ಸೂಚಿಸಿರುವಂತೆ ದಿನಾಂಕ 02.05.2026 ಮತ್ತು 16.07.2026 ರಂದು ನಡೆದ ವಿದ್ಯಾವಿಷಯಕ ಪರಿಷತ್ ಸಭೆಯಲ್ಲಿ ಮೇಲಿನ ಪ್ರಸ್ತಾವನೆಗಳನ್ನು ಅನುಮೋದಿಸಿರುವ ಹಿನ್ನಲೆಯಲ್ಲಿ ಅಧಿಸೂಚನೆಯನ್ನು ಪ್ರಕಟಿಸಲಾಗಿದೆ.

Computer Science- BCA ಅಧ್ಯಯನ (ಸ್ನಾತಕ) ವಿಷಯದ ಪಠ್ಯಕ್ರಮಗಳನ್ನು ವಿಶ್ವವಿದ್ಯಾಲಯದ ವೆಬ್‌ಸೈಟ್ (hassanuniversity.ac.in) ನಿಂದ ಪಡೆಯಬಹುದಾಗಿದೆ.

ಬಿ.ಎ.ಜಗದೀಶ ಕೆ.ಎ.ಎಸ್
ಕುಲಸಚಿವರು (ಆಡಳಿತ)

ಇವರಿಗೆ:

1. ವಿಶ್ವವಿದ್ಯಾಲಯದ ಸಂಯೋಜನೆಗೊಳಪಟ್ಟ ಎಲ್ಲಾ ಕಾಲೇಜುಗಳ ಪ್ರಾಂಶುಪಾಲರುಗಳಿಗೆ–ಅಗತ್ಯ ಕ್ರಮಕ್ಕಾಗಿ.
2. ಕುಲಸಚಿವರು (ಮೌಲ್ಯಮಾಪನ) ಹಾಸನ ವಿಶ್ವವಿದ್ಯಾಲಯ,ಹಾಸನ.
3. ಹಾಸನ ವಿಶ್ವವಿದ್ಯಾಲಯದ ಎಲ್ಲಾ ವಿಭಾಗಗಳ ಡೀನರು, ಹಾಸನ ವಿಶ್ವವಿದ್ಯಾಲಯ,ಹಾಸನ.
4. ಹಾಸನ ವಿಶ್ವವಿದ್ಯಾಲಯದ ಎಲ್ಲಾ ಅಧ್ಯಯನ ಮಂಡಳಿಗಳ ಮುಖ್ಯಸ್ಥರು, ಹಾಸನ ವಿಶ್ವವಿದ್ಯಾಲಯ,ಹಾಸನ.
5. ನಿರ್ದೇಶಕರು, ಕಾಲೇಜು ಅಭಿವೃದ್ಧಿ ಮಂಳಿ, ಹಾಸನ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಹಾಸನ.
6. ಕಛೇರಿ ಪ್ರತಿ.

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HASSAN UNIVERSITY

SEP – 2024

CURRICULUM STRUCTURE AND SYLLABUS

Bachelor of Computer Applications (BCA) Programme

[According to SEP (State Education Policy): 2024]

w.e.f Academic Year 2026-27

Under Graduate Board of Studies in

Computer Science and B.C.A.

Hassan University, Hemagangothri,

Hassan, Karnataka.

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Curriculum Design / Syllabus Framing Committee

Sl. No.	Name	Designation
1.	**Prof. Prabhakar C. J.** Professor, Dept of Studies and Research in Computer Science, Kuvempu University, Shankaraghatta, Shivamogga.	**Chairman**
2.	**Prof. Arjun B.C.** Professor, Dept of Computer Science and Engineering (AIML), Malnad College of Engineering, Hassan.	**Member**
3.	**Sri. Balakrishna M.** Associate Professor, Dept of Computer Science, Govt. First Grade College for Women, M G Road, Hassan,	**Member**
4.	**Smt. Sushmitha Vadone V.** Assistant Professor, Dept of Computer Science, Govt. Home Science College, Salagame Road, Hassan.	**Member**
5.	**Smt. Saritha N.** Assistant Professor, Assistant Professor, Dept of Computer Science, Govt. First Grade College for Women, M G Road, Hassan.	**Member**
6.	**Sri. Suresh Kumar H. M.** Assistant Professor, Dept of Computer Science, Govt. First Grade College for Women, Gandhadakoti, Hassan.	**Member**

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The Objectives of the BCA Programme

Graduates of the BCA Program will be able to:

PEO1: Build strong foundations in computer applications, programming, algorithms, databases, networking, and emerging technologies to pursue successful careers in IT and related fields.

PEO2: Apply analytical thinking, problem-solving skills, and software development principles to design and implement computing solutions for real-world problems.

PEO3: Demonstrate professional competence, ethical values, teamwork, communication skills, and leadership qualities in multidisciplinary environments.

PEO4: Adapt to evolving technologies through lifelong learning, higher education, research, entrepreneurship, and professional development.

PEO5: Utilize modern tools and innovative technologies such as AI, Machine Learning, Full Stack Development, Blockchain, and IoT to meet industry and societal needs.

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Program Outcomes

At the end of the BCA program, graduates will be able to:

PO1 – Computational Knowledge

Apply fundamentals of computing, mathematics, programming, databases, networking, and software development.

PO2 – Problem Analysis

Analyze and solve complex problems using logic, algorithms, and computational techniques.

PO3 – Design and Development

Design and develop efficient software solutions and systems to meet requirements.

PO4 – Modern Tool Usage

Use current tools, technologies, AI platforms, and development environments effectively.

PO5 – Teamwork and Communication

Work effectively individually and in teams; communicate technical ideas clearly.

PO6 – Practical and Project Skills

Apply knowledge through labs, projects, and real-world problem solving.

PO7 – Innovation and Emerging Technologies

Apply skills in emerging areas like ML, IoT, Blockchain, Data Science, and new technologies.

PO8 – Ethics, Society, and Lifelong Learning

Follow professional ethics, consider societal/environmental impact, and pursue lifelong learning and career growth.

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Hassan University

SEP Based Curriculum Structure for Bachelor of Computer Applications (BCA) Programme 2026-2027

CASE 3: Single Subject specialization degree in all 6 Semesters (Course Structure, Scheme of Teaching and Evaluation - 2026-27)

Allocation of credits for BCA Programme

Sl.No.	Subject Category	No. of Credits
1	Major Courses	90
2	Languages	24
3	Compulsory	10
4	Electives	04
Total		**128**

Semester-wise allocation of credits (Three Subjects combination)

Year	Semester	Total Credits
1	I	30
	II	
2	III	36
	IV	
3	V	34
	VI	
Total		**100**

1. Credit for the three major courses includes theory, practical (skill enhancement course), and tutorial/assignment/survey-based assignment/internship.
2. Practical paper(s) (Compulsory/Skill enhancement course) should provide practical experience which is complimentary to theory major paper(s).
3. Project Work/Dissertation/Internship/Apprenticeship Embedded Degree Programme (AEDP) should also be considered to be part of the curriculum.

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Sem.	Course/ Paper Code	Title of the Paper	Subject Category	Teaching Hour/week	Semester End Exam.	Internal Assessment	Total Marks	Credits	Examination Duration
1	2	3	4	5	6	7	8	9	10
Semester-I									
1	26BCA11	Fundamentals of Computers	**BC-T**	04	80	20	**100**	04	3 Hrs.
	26BCA12	Programming in C	**BC-T**	04	80	20	**100**	04	3 Hrs.
	26BCA13	Mathematical Foundation	**BC-T**	03	80	20	**100**	03	3 Hrs.
	26BCA11P	C programming LAB	**BC-P**	04	40	10	**50**	02	3 Hrs.
	26BCA12P	Information Technology LAB	**BC-P**	04	40	10	**50**	02	3 Hrs.
	Total			**19**	**320**	**80**	**400**	**15**	---
Semester-II									
2	26BCA21	Data Structures	**BC-T**	04	80	20	**100**	04	3 Hrs.
	26BCA22	Python Programming	**BC-T**	04	80	20	**100**	04	3 Hrs.
	26BCA23	Operating System	**BC-T**	03	80	20	**100**	03	3 Hrs.
	26BCA21P	Data Structures using Python LAB	**BC-P**	04	40	10	**50**	02	3 Hrs.
	26BCA22P	Python Programming LAB	**BC-P**	04	40	10	**50**	02	3 Hrs.
	Total			**19**	**320**	**80**	**400**	**15**	---
Semester-III									
3	26BCA31	Database Management System	**BC-T**	04	80	20	**100**	04	3 Hrs.
	26BCA32	Design and Analysis of Algorithms	**BC-T**	04	80	20	**100**	04	3 Hrs.
	26BCA33	Computer Communication and Networks	**BC-T**	03	80	20	**100**	03	3 Hrs.
	26BCA31P	PL/SQL lab	**BC-P**	04	40	10	**50**	02	3 Hrs.
	26BCA32P	Design and Analysis of Algorithms using Python Lab	**BC-P**	04	40	10	**50**	02	3 Hrs.
	26BCAE1	Elective I	**EL/OP-I**	02	40	10	**50**	02	2 Hrs.
	Total			**21**	**360**	**90**	**450**	**17**	---
Semester-IV									
4	26BCA41	R Programming	**BC-T**	04	80	20	**100**	04	3 Hrs.
	26BCA42	Advanced Java	**BC-T**	04	80	20	**100**	04	3 Hrs.
	26BCA43	Prompt Engineering	**BC-T**	03	80	20	**100**	03	3 Hrs.
	26BCA41P	R Programming LAB	**BC-P**	04	40	10	**50**	02	3 Hrs.
	26BCA42P	Advanced Java LAB	**BC-T**	04	40	10	**50**	02	3 Hrs.
	26BCAE2	Elective II	**EL/OP-II**	02	40	10	**50**	02	2 Hrs.
	26BCAC1	Compulsory Paper 1: Theory- Digital Marketing	**Compusory-1**	02	40	10	**50**	02	2 Hrs.
		Total		**23**	**400**	**100**	**500**	**19**	---

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Semester-V									
5	26BCA51	Web Technologies	**BC-T**	04	80	20	**100**	04	3 Hrs.
	26BCA52	Artificial Intelligence and Machine Learning	**BC-T**	04	80	20	**100**	04	3 Hrs.
	26BCA53	Blockchain Technology	**BC-T**	03	80	20	**100**	03	3 Hrs.
	26BCA51P	Web Technologies LAB	**BC-P**	04	40	10	**50**	02	3 Hrs.
	26BCA52P	AI and ML using Python LAB	**BC-P**	04	40	10	**50**	02	3 Hrs.
	26BCAC2	Compulsory Paper -2: Internship	**Compulsory-2**	02	40	10	**50**	02	2 Hrs.
	Total			**21**	**360**	**90**	**450**	**17**	---
Semester-VI									
6	26BCA61	Computer Graphics and Image Processing	**BC-T**	04	80	20	**100**	04	3 Hrs.
	26BCA62	Full Stack Development	**BC-T**	04	80	20	**100**	04	3 Hrs.
	26BCA63	Internet of Things	**BC-T**	03	80	20	**100**	03	3 Hrs.
	26BCA61P	Computer Graphics and Image Processing LAB	**BC-P**	04	40	10	**50**	02	3 Hrs.
	26BCA62P	Full Stack Development LAB	**BC-P**	04	40	10	**50**	02	3 Hrs.
	26BCA63P	Compulsory Paper -3: Project	**Compulsory-3**	04	40	10	**50**	02	3 Hrs.
	Total			**23**	**360**	**90**	**450**	**17**	---
	Grand total			**126**	**2120**	**530**	**2650**	**100**	---

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Practical Proper Examination I-VI semesters
Duration: 03 Hrs

Internal Assessment for Practical Paper I-VI semesters

• Test -1	-	05 Marks
• Continuous Assessment of Record		05 Marks
	Total	**10 Marks**

Project Work/Internship during VI semester

- Project work/Dissertation/Internship and preparation of Report - 40 Marks
- Viva Voice -10 Marks

Total 50 Marks

Continuous Assessment Programme/Internal Assessment/Formative Assessment Major Courses

Sl. No.	Continuous Assessment Programme/Internal Assessment	Maximum Marks
(1)	(2)	(3)
01	Test -1 and Test -2 with proper record for assessment	10
02	Assignment with proper record for assessment	10
TOTAL MARKS		20

Continuous Assessment Programme/Internal Assessment/Formative Assessment for Elective/Optional Papers/Compulsory Paper (Theory)

Sl. No.	Continuous Assessment Programme/Internal Assess-ment	Maximum Marks
(1)	(2)	(3)
01	Test -1 and Test - 2 with proper record for assessment	05
02	Assignment with proper record for assessment	05
TOTAL MARKS		10

Electives in BCA

Sl. No.	Semester	Elective	Electives Offered
01	THIRD SEMESTER	Elective I	Any one from the following • Cyber Security • Cloud Computing
02	FOURTH SEMESTER	Elective II	Any one from the following • Software Engineering • Fundamentals of Data Science

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SEMESTER: I

Course Code: 26BCA11	**Course Title**: Fundamentals of Computers
Course Credits: 04	**Teaching Hours per Week**: 04
Total Contact Hours: 52	**Internal Assessment**: 20
Exam Duration: 03 Hours	**Semester end Exam Marks**: 80

Course Objectives

- To introduce basic concepts of computers and their components.
- To understand number systems, codes, and digital logic.
- To learn Boolean algebra and logic gate operations.
- To understand computer organization and software concepts.
- To familiarize internet and computing applications.

Course Outcomes

- Explain computer fundamentals and architecture.
- Apply number system conversions and logic concepts.
- Analyze Boolean expressions and logic circuits.
- Understand digital and computing concepts.
- Apply computing knowledge in practical situations.

Contents	hours
Unit-1: **Introduction to Computers** – Definition, Characteristics, and History of Computers. **Anatomy of a Computer** – Central Processing Unit (CPU), Memory/Storage Units, Input and Output Devices. Types of Computers. **Types of Software** – System Software, Application Software, and Utility Software. **Computer Languages** – Machine Level, Assembly Level, and High-Level Languages. **Translators** – Assembler, Interpreter, and Compiler.	14
Unit-2: **Number Systems** – Binary, Octal, Decimal, and Hexadecimal. Conversion between Number Systems (Binary to Decimal, Decimal to Binary, Decimal to Hexadecimal, Hexadecimal to Decimal, etc.). **Complements** – 1's Complement and 2's Complement, Subtraction using 1's complement and 2's complement. **Computer Codes** – BCD, Gray Code, ASCII, and Unicode.	12

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Unit-3 **Basic Logic Gates** – AND, OR, NOT, NAND, NOR, XOR, XNOR and their operations. Universal Gates. Realization of basic gates AND and OR using NAND and NOR universal gates. **Boolean Algebra** – Basic Definitions, Laws, Theorems, and Properties of Boolean Algebra. Representation using Venn Diagrams. **Introduction to Combinational Circuits** – Half Adder, Full Adder, Half Subtractor and Full Subtractor (concepts, Truth Table and Logic Diagram).	12
Unit-4 **Boolean Functions and Standard Forms** – Canonical Forms, Minterms and Maxterms. **Simplification of Boolean Functions** – Karnaugh Maps (2-variable, 3-variable, and 4-variable maps), Don't Care Conditions, Product of Sums (POS) and Sum of Products (SOP). Internet Concepts – Internet, World Wide Web (WWW), Search Engines, and IP Address.	14

References

1. Computer Fundamentals, V Rajaraman.
2. Computer System Architecture (3rd edition) Morris Mano PHI.
3. Pradeep K. Sinha and Priti Sinha: Computer Fundamentals (Sixth Edition)
4. Link : Word - ppt - sheet. https://support.microsoft.com/en-us/office/

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Course Code: 26BCA11P	**Course Title**: Information Technology LAB
Course Credits: 02	**Teaching Hours per Week**: 04
Total Contact Hours: 52	**Internal Assessment**: 10
Exam Duration: 03 Hours	**Semester end Exam Marks**: 40

Course Objectives

- To familiarize computer operations and software tools.
- To develop skills in document creation and presentations.
- To introduce spreadsheet operations.
- To enable use of IT tools.
- To build practical computing skills.

Course Outcomes

- Use office tools effectively.
- Create documents and presentations.
- Apply spreadsheet formulas and charts.
- Use IT tools for basic problem solving.
- Demonstrate practical computing skills.

Contents

PART - A

1. Create biodata using word processor
2. Create timetable in word processor with text formatting
3. Create Content page with header and footer, including page number, date , title using word processo
4. Create Invitation card for College Event using word processor
5. Create a Presentation with content animation
6. Create personalized letters using the Mail Merge feature in Microsoft Word.
7. Draw a Hierarchical Diagram / Flowchart using shapes feature in Microsoft Word

PART- B

1. Create a Presentation with Slide transition
2. Create student ID card with photo in Presentation
3. Create student marks card in Spreadsheet
4. Plot Bar Chart and Line Chart in Spreadsheet for tabular data
5. Create inventory Bill in Spreadsheet with formulas.
6. Create a Salary slip with Basic, DA, (20% of Basic Salary), HRA (8% of Basic Salary), and Deduction. (10% of Total Salary) using Spreadsheet
7. Demonstrate usage of Filters in Spreadsheet.

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Internal Assessment	
Test - 1	5 Marks
Record	5 Marks
Total	10 Marks

Assessment Criteria Marks		**Marks**
Writing	One Program from Part A	10
	One Program from Part B	15
Execution	Any one of the Written Program	10
Viva Voce		5
Total		**40**

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Course Code: 26BCA12	**Course Title:** Programming in C
Course Credits: 04	**Teaching Hours per Week:** 04
Total Contact Hours: 52	**Internal Assessment:** 20
Exam Duration: 03	**Semester end Exam Marks:** 80

Course Objectives

- To develop problem-solving skills using algorithms and flowcharts.
- To introduce structured programming using C.
- To implement control structures, arrays, and functions.
- To understand pointers, structures, and unions.
- To build logical and analytical thinking.

Course Outcomes

- Write C programs using programming constructs.
- Implement arrays, functions, and control structures.
- Apply pointers and structures in programs.
- Debug and test programs effectively.
- Solve problems using structured programming.

Contents	hours
Unit-1: **Problem solving with a Computer** - Algorithm and Flowchart- Notations, Examples- Area of a circle, find largest of 3 numbers, sum N number. **Overview of C** - History and Features of C, Structure of a C Program, Creating and Executing a C Program. C Character Set, C tokens - keywords, identifiers, constants, and variables. **Data types** - Declaration & initialization of variables, Symbolic constants. **Header files** - stdio, conio, maths, string, ctype.	14
Unit-2: **Input and output with C**: Formatted I/O functions - printf and scanf, control stings and escape sequences. Unformatted I/O functions - getchar, putchar, gets and puts functions. Arithmetic operators, Relational operators, Logical operators, Assignment operators, Increment & Decrement operators, Bitwise operators, Conditional operator, Special operators, Operator Precedence and Associativity, Evaluation of arithmetic expressions. **Control Structures** - if, if_else, Switch Case, goto, break & continue statements. **Looping Statements** - while, do-while, for loops, Nested loops.	14
Unit-3: **Arrays** - One Dimensional arrays - Declaration, Initialization and Memory representation. **Two Dimensional arrays** - Declaration, Initialization and Memory representation. **Pointers in C** - Definition, Declaring and initialising pointers, accessing address and value of variables using pointers, Pointer Arithmetic, Advantages and disadvantages of using pointers.	12

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Unit-4: **User Defined Functions** - Need, structure of C user defined functions. Categories of user defined functions - With and without parameters and return type. function call - call by value, call by reference. **Structures** - Structure Definition, Advantages of Structure, declaring, initialization accessing structure members. Unions - Union definition, declaration, initialization. difference between Structures and Unions.	12

References

1. E. Balagurusamy: Programming in ANSI C (TMH)
2. V. Rajaraman: Programming in C (PHI – EEE)
3. S. Byron Gottfried: Programming with C (TMH)
4. Yashwant Kanitkar: Let us C
5. Kamathane: Programming with ANSI and TURBO C (Pearson Education)

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Course Code: 26BCA12P	**Course Title**: C Programming LAB
Course Credits: 02	**Teaching Hours per Week**: 04
Total Contact Hours: 52	**Internal Assessment**: 10
Exam Duration: 03	**Semester end Exam Marks**: 40

Course Objectives

- To develop programming skills in C.
- To implement problem-solving techniques.
- To understand arrays, functions, and pointers.
- To enhance logical thinking.
- To improve debugging skills.

Course Outcomes

- Write and execute C programs.
- Develop programs using arrays and functions.
- Apply pointers and structures.
- Debug programs effectively.
- Solve problems using C programming.

Contents

PART - A

1. Write a C Program to read radius and find surface area and volume of a sphere.
2. Write a C Program to read three numbers and find the biggest of three
3. Write a C Program to demonstrate library functions in math.h (at least 5)
4. Write a C Program to read a number, find the sum of the digits, reverse the number and check it for palindrome
5. Write a C Program to read percentage of marks and to display appropriate grade (using switch case)
6. Write a C program to read marks scored in 3 subjects by n students and find the average of marks and result (Demonstration of single dimensional array)
7. Write a C Program to remove Duplicate Element in a single dimensional Array
8. Program to perform addition and subtraction of Matrices

PART- B

1. Write a C Program to find the length of a string without using built in function
2. Write a C Program to demonstrate string functions (at least 3).
3. Write a C Program to swap two numbers using pointers.
4. Write a C Program to generate n prime number
5. Write a C Program to find the trace of a square matrix using function
6. Write a C Program to read, display and multiply two matrices using function
7. Write a C Program to read a string and to find the number of alphabets, digits, vowels, consonants, spaces and special characters.
8. Write a C Program to demonstrate structure to read & display student information.

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Internal Assessment	
Test - 1	5 Marks
Record	5 Marks
Total	10 Marks

Assessment Criteria Marks		**Marks**
Writing	One Program from Part A	10
	One Program from Part B	15
Execution	Any one of the Written Program	10
Viva Voce		5
Total		**40**

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Course Code: 26BCA13	**Course Title:** Mathematical Foundation
Course Credits: 03	**Teaching Hours per Week: 03**
Total Contact Hours: 48	**Internal Assessment: 20**
Exam Duration: 03 Hours	**Semester end Exam Marks: 80**

Course Objectives

- To understand sets, relations, and functions.
- To learn mathematical logic and reasoning.
- To introduce matrices and determinants.
- To understand statistical methods.
- To develop analytical skills.

Course Outcomes

- Apply concepts of sets, relations, and functions.
- Solve problems using matrices and determinants.
- Apply logical reasoning in problem solving.
- Analyze data using statistical methods.
- Use mathematical concepts in computing.

Contents	hours
Unit-1: Set and Function Definition of set, methods of representation of sets (property method and listing method), set operation (union, intersection, complement, Cartesian product of sets), properties of sets (commutative, associative and distributive), Definition of function, types of function (linear, quadratic, polynomial) with examples. One-to-one function, onto function, function composition and inverse functions	12
Unit-2: Relations and Mathematical Logic: Properties of Relations, Relation Matrices and Directed Graphs, Equivalence Relations and Partitions. Mathematical Logic: Statements Connectives - Negation, Conjunction, Disjunction- Statement Formulas and Truth Tables- Conditional and Bi-Conditional Statements- Tautology, Contradiction.	12
Unit-3: Matrix and Determinants: Introduction-Types of matrices - only definition and examples (Row matrix, column matrix, rectangular matrix, square matrix, zero matrix, diagonal matrix, scalar matrix, identity matrix). Matrix operations. Transpose of a matrix. Determinant of matrix. Inverse of a matrix, Cramer's rule, Eigenvalues, Problems on Eigenvalues.	12
Unit-4: Statistical Methods: Statistics: Introduction, Frequency Distribution. Measures of Central Tendency – Mean (Grouped and Ungrouped), Median (Ungrouped only), Mode (Discrete Series only) Measures of Dispersion – Standard Deviation (Assumed Mean Method only) and Coefficient of Variation (Meaning and formula only). Correlation – Meaning, Types, and Rank Correlation (Spearman's method only).	12

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References

1. **Ajit Kumar, S. Kumaresan, B. K. Sarma,** *A Foundation Course in Mathematics*, 1st Edition, 2018, Alpha Science International Ltd.
2. **Y. N. Singh**, *Discrete Mathematical Structures*, 1st Edition, 2010, Wiley India Pvt. Ltd.
3. **A. R. Vasishtha, A. K. Vasishtha**, *Matrices*, Revised Edition, 2014, Krishna Prakashan Media (P) Ltd.
4. **S. C. Gupta, V. K. Kapoor,** *Fundamentals of Mathematical Statistics*, Latest Revised Edition, Sultan Chand & Sons.
5. **N. K. Nag**, *Business Mathematics and Statistics*, 2nd Edition, 2011, McGraw Hill Education (India) Pvt. Ltd.
6. **Ravindra Bapat**, *Linear Algebra and Linear Models*, 2nd Edition, 2010, Springer India.
7. Discrete Mathematical Structures, Trembley and Manohar.

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SEMESTER: II

Course Code: 26BCA21	**Course Title:** Data Structures
Course Credits: 04	**Teaching Hours per Week:** 04
Total Contact Hours: 52	**Internal Assessment:** 20
Exam Duration: 03 Hours	**Semester end Exam Marks:** 80

Course Objectives

- To introduce linear and non-linear data structures.
- To implement stacks, queues, and linked lists.
- To understand recursion and algorithms.
- To learn searching and sorting techniques.
- To analyze efficiency of data structures.

Course Outcomes

- Explain different data structures.
- Implement stacks, queues, and linked lists.
- Apply searching and sorting algorithms.
- Analyze algorithm performance.
- Design solutions using data structures.

Contents	hours
Unit-1 Data structures - Definition, Types of data structures - Primitive & Non-primitive, Linear and Nonlinear. **Stacks** - Definition and Representation of stacks, Operations on stacks. Applications of stacks; Infix, postfix and prefix notations, convert infix to postfix, Evaluation of postfix expression using stack. Recursive function -Definition, Examples - Fibonacci number, factorial of number.	14
Unit-2 **Queues** - Definition and Representation of queues; Types of queues – Simple queue and Operations, Circular queue and Operations. Priority queue (concept only), Double ended queue (concept only). **Sorting** – Selection sort, Bubble sort, insertion sort, Merge sort, Searching - Sequential Search, Binary search.	12
Unit-3 **Linked list:** Definition and Representation of linked list, Types of linked lists - Singly linked list, doubly linked list, Circular linked list; Operations on Singly linked lists – Traversing, Searching, Insertion, Deletion; Memory allocation, Garbage collection. **Doubly Linked List**: Memory Representation of Singly Linked List and Doubly Linked Lists. Applications of Linked List.	12

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Unit-4 **Trees**: Definition; Tree terminologies –node, root node, parent node, ancestors of a node, siblings, terminal & non-terminal nodes, degree of a node, level, edge, path, depth; Binary tree: **Type of binary trees** - strict binary tree, complete binary tree, binary search tree; Array representation of binary tree. Traversal of binary tree; preorder, inorder and postorder traversal.	14

References

1. Ellis Horowitz and Sartaj Sahni: Fundamentals of Data Structures
2. Tanenbaum: Data structures using C (Pearson Education)
3. Kamathane: Introduction to Data structures (Pearson Education)
4. Y. Kanitkar: Data Structures Using C (BPB)
5. Kottur: Data Structure Using C
6. Padma Reddy: Data Structure Using C

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Course Code: 26BCA11P	**Course Title**: Data Structure using Python LAB
Course Credits: 02	**Teaching Hours per Week**: 04
Total Contact Hours: 52	**Internal Assessment**: 10
Exam Duration: 03	**Semester end Exam Marks**: 40

Course Objectives

- To implement data structures using programming.
- To develop programs for sorting and searching.
- To implement stacks, queues, and linked lists.
- To understand recursion.
- To improve problem-solving skills.

Course Outcomes

- Implement sorting and searching programs.
- Develop stack and queue applications.
- Implement linked list operations.
- Apply recursion techniques.
- Solve problems using data structures.

Contents

PART - A

1. Write a PYTHON program to find GCD using recursive function
2. Write a PYTHON program to generate N Fibonacci numbers using a recursive function.
3. Write a PYTHON program to generate Factorial of a given number using a recursive function.
4. Write a PYTHON program to sort the given list using Bubble sort technique.
5. Write a PYTHON program to sort the given list using selection sort technique.
6. Write a PYTHON program to sort the given list using insertion sort technique
7. Write a PYTHON program to sort the given list using merge sort technique - recursive
8. Write a PYTHON program to search an element using linear search technique

PART- B

1. Write a PYTHON program to implement Stack.
2. Write a PYTHON program to convert an infix expression to postfix.
3. Write a PYTHON Program to implement a simple queue.
4. Write a PYTHON program to implement a Circular queue.
5. Write a PYTHON program to implement insert at the beginning of a singly linked list and display.
6. Write a PYTHON program to delete a node at the end of a singly linked list.
7. Write a PYTHON program to search an element using recursive binary search technique.
8. Write a PYTHON program to implement inorder traversal of a binary tree.

Internal Assessment	
Test - 1	5 Marks
Record	5 Marks
Total	10 Marks

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Assessment Criteria Marks		Marks
Writing	One Program from Part A	10
	One Program from Part B	15
Execution	Any one of the Written Program	10
Viva Voce		5
Total		**40**

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Course Code: 26BCA22	**Course Title:** Python Programming
Course Credits: 04	**Teaching Hours per Week:** 04
Total Contact Hours: 52	**Internal Assessment:** 20
Exam Duration: 03 Hours	**Semester end Exam Marks:** 80

Course Objectives

- To introduce Python programming fundamentals.
- To develop programs using data structures and functions.
- To implement file handling and OOP concepts.
- To use Python libraries for data analysis.
- To build application development skills.

Course Outcomes

- Write Python programs using control structures.
- Use lists, tuples, and dictionaries.
- Implement file handling and OOP concepts.
- Use Python libraries for data processing.
- Develop Python-based applications.

Contents	Hours
Unit-1: **Introduction:** Features and Applications of Python; Simple Python Program. Identifiers; Keywords; Statements and Expressions; Variables; Operators; Precedence and Association; Data Types; Indentation; Comments; Built-in Functions-Console Input and Console Output, Type Conversions; Python Libraries; Importing Libraries with Examples. **Python Conditional Statement:** Conditional Statements - if, if else, elif, if elif else, match case, looping Statements- while loop, for loop Statement; break, continue statements, range () and exit () functions. **Arrays:** Definition, syntax, accessing the elements of an arrays, array method	14
Unit-2: **Python Functions:** Types of Functions; Defining Functions, Calling Functions, Passing Parameters/arguments, the return statement; Default Parameters; Command line Arguments; Key Word Arguments; Recursive Functions; Scope and Lifetime of Variables in Functions. **Strings:** Creating and Storing Strings; the str() function; Operations on Strings- Concatenation, Comparison, Slicing and Joining, Traversing; Format Specifiers; Escape Sequences; Raw and Unicode Strings; Python String Methods. **Lists:** Creating Lists; Operations on Lists; Built-in Functions on Lists; Implementation of Stacks and Queues using Lists. **Dictionaries**: Creating Dictionaries; Operations on Dictionaries; Built-in Functions on Dictionaries; Dictionary Methods; Populating and Traversing Dictionaries.	14
Unit-3 **Tuples and Sets:** Creating Tuples; Operations on Tuples; Built-in Functions on Tuples; Tuple Methods; Creating Sets; Operations on Sets; Built-in Functions on Sets; Set Methods. **File Handling**: File Types, Operations on Files– Opening and Closing files, Reading and Writing files: write( ) and write lines( ) methods, append() method, read( )and read lines( )methods, Renaming and deleting files. **Object Oriented Programming:** Classes and Objects; Creating Classes and Objects; Classes with Multiple Objects; Objects as Arguments; Objects as Return Values; Constructor, types of constructors, Inheritance - Single and Multiple Inheritance, Multilevel and Multipath Inheritance.	12

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Unit-4 **GU Interface:** The tkinter Module; Window and Widgets; Layout Management- pack, grid and place. **Python SQLite:** The SQLite3 module; SQLite Methods- connect, cursor, execute, close; Connect to Database; Create Table; Operations on Tables- Insert, Select, Update. Delete and Drop Records. **Data Analysis:** Introduction to NumPy, Array Creation using NumPy, Operations on Arrays; Introduction to Pandas, Series and Data Frames, Creating Data Frames from Excel Sheet and .csv file, Dictionary and Tuples. Operations on Data Frames. **Data Visualization:** Introduction to Data Visualization; Matplotlib Library; Different Types of Charts using Pyplot- Line chart, Bar chart, Histogram & Pie chart.	12

Reference Books:

Introduction to Python Programming: Gowrishankar S, Veena A, CRC Press / BSP Books, 2019

Python Programming: Using Problem Solving Approach by Reema Thareja, Oxford University Press, 2nd Edition, 2023.

Learning Python by Mark Lutz, O'Reilly Media, 5th Edition, 2013.

Python: The Complete Reference by Martin C. Brown, McGraw-Hill Education, 2nd Edition, 2018.

Python for Data Analysis by Wes McKinney, O'Reilly Media, 3rd Edition, 2022.

Head First Python by Paul Barry, O'Reilly Media, 3rd Edition, 2023.

Advance Core Python Programming, Meenu Kohli, BPB Publications, 2021.

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Course Code: 26BCA22P	**Course Title**: Python Programming Lab
Course Credits: 02	**Teaching Hours per Week**: 04
Total Contact Hours: 52	**Internal Assessment**: 10
Exam Duration: 03 Hours	**Semester end Exam Marks**: 40

Course Objectives

- To develop programming skills in Python.
- To implement data structures and functions.
- To introduce file handling and GUI programming.
- To use libraries for data analysis.
- To build application development skills.

Course Outcomes

- Write Python programs.
- Use data structures in Python.
- Perform file and database operations.
- Create GUI applications.
- Develop practical applications.

Contents

PART – A

1.Python script for checking the given year is leap year or not.
2. Python script to check if a number belongs to the Fibonacci Sequence
3. Python script to solve Quadratic Equations
4. Python script to display all numbers which are divisible by 7 but are not a multiple of 5, between given range X and Y.
5. Python script to display Multiplication Tables
6. Python script to create a calculator program
7. Determine Whether the Given String is a palindrome or not using String Slicing
8. Implementation of python script that takes a list of words and returns the length of the longest one.

PART- B

1. Implement python script to remove duplicates from a list.
2. Implement python script to check whether a given key already exists or not in a dictionary.
3. Create SQLite Database and Perform Operations on Tables.
4. Create a GUI that takes two numbers, adds them on button click, and displays the result using Tkinter.
5. Drawing Line chart and Bar chart using Matplotlib.
6. Drawing Histogram and Pie chart using Matplotlib.
7. Create Array using NumPy and Perform Arithmetic Operations (+, -, *, /) and Statistical operations (sum, mean, min, max) on Array.
8. Create DataFrame from Excel sheet using Pandas and Perform Operations (display data using head() and tail() functions, row and column conditional selection) on DataFrames.

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Internal Assessment	
Test - 1	5 Marks
Record	5 Marks
Total	10 Marks

Assessment Criteria Marks		**Marks**
Writing	One Program from Part A	10
	One Program from Part B	15
Execution	Any one of the Written Program	10
Viva Voce		5
Total		**40**

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Course Code: 26BCA22	**Course Title**: Operating System
Course Credits: 03	**Teaching Hours per Week**: 03
Total Contact Hours: 48	**Internal Assessment**: 20
Exam Duration: 03 Hours	**Semester end Exam Marks**: 80

Course Objectives

- To introduce operating system concepts.
- To understand process management and scheduling.
- To learn memory and file management.
- To study deadlocks and resource allocation.
- To understand system operations.

Course Outcomes

- Explain operating system concepts.
- Analyze scheduling and memory techniques.
- Apply file system concepts.
- Understand deadlock handling.
- Evaluate system performance.

Contents	hours
Unit-1: **Introduction to Operating System**: Definition, Early systems – Batch Systems, Multiprogramming, Time Sharing,Real time system, Handheld systems and Distributed systems. Open Source Operating Systems. **Process Management: Process** Concept- Process Definition, Process State, Process Control Block, Process scheduling- Scheduling Queues, Schedulers, Context switch. Inter process communication (IPC) .	12
Unit-2 : **CPU Scheduling** - CPU I/O burst cycle, CPU Scheduler, Preemptive scheduling, Dispatcher. Scheduling criteria, Scheduling Algorithms- First-Come-First-Served (FCFS), Shortest Job First (SJF), Priority Scheduling, Round Robin scheduling algorithms. **Deadlocks** - Definition with example, System Model, Deadlocks Characterization- – Necessary Conditions, Resource Allocation Graph, Methods for Handling Deadlocks - Deadlock Prevention, Deadlock Avoidance.	12

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Unit-3 **Memory Management** - Logical and Physical Address Space, Swapping, Contiguous Allocation, Fragmentation, Paging, Segmentation. Virtual Memory: Definition, Demand Paging, Page Replacement Algorithms -First In First Out (FIFO), Optimal Page replacement. Thrashing.	12
Unit-4 **File System** - File Concepts, Attributes, Operations and Types of Files. File Access methods, Directory Structure, Protection and consistency semantics. File System Implementation- File System Structure, File Allocation Methods, Free Space Management. Disk Structure, **Disk Scheduling**-Definition, Algorithms- FCFS, SSTF, SCAN.	12

References:

1. Operating System Concepts, Silberschatz' et al., 10thEdition, Wiley, 2018.
2. Operating System Concepts - Engineering Handbook, Ghosh PK, 2019.
3. Understanding Operating Systems, McHoes A et al., 7th Edition, Cengage Learning,2014.
4. Operating Systems - Internals and Design Principles, William Stallings, 9th Edition,Pearson.
5. Operating Systems – A Concept Based Approach, Dhamdhere, 3rd Edition, McGrawHill Education India.

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THEORY EXAMINATION QUESTION PAPER PATTERN FOR MAJOR SUBJECTS

(Semesters I –VI)

B.C.A Semester-I Degree Examination; 2026-27

(Semester Scheme; New Syllabus: 2026-27)

SUBJECT: BCA

Paper –_____: _____

Paper Code: _____

Time: 3 Hours **Max. Marks: 80**

Instructions to candidates:

1) All sections are compulsory
2) Draw neat and labelled diagrams wherever necessary.

Question paper pattern for Theory Courses (3 Credits):

Instructions: Answer Part-A and Part-B:

Part-A

Answer any 10 out of 12 Questions (3 Questions drawn from each unit). Each question carries 2 Marks. (10 X 2 =20)

Q. No. 1 to Q. No. 12.

Part-B

Answer all the Questions. Each question carries 15 Marks. (4 X 15 =60) (Each question with internal choice and with maximum of 3 sub questions)

THEORY EXAMINATION QUESTION PAPER PATTERN FOR ELECTIVE/OPTIONAL PAPERS

(Semesters III & IV)

B.C.A. Semester-I/II/III/IV/V Degree Examination; 2026-27 (Semester Scheme; New Syllabus: 2026-27)

SUBJECT: BCA

Paper – ELECTIVE/OPTIONAL III & IV _____: .

Paper Code: _____

Time: 2 Hours **Max. Marks: 40**

Instructions to candidates:

1) All sections are compulsory
2) Draw neat and labelled diagrams wherever necessary.

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Question paper pattern for Theory Courses (2 Credits):

Maximum Marks – 40

Part A: Answer any 5 questions: (5x2=10 Marks) Question No. 1 to 6

Part B: Answer the following questions: (10x3=30 Marks)

7. a) 7. b) or 7. c) 7. d)

8. a) 8. b) or 8. c) 8. d)

9. a) 9. b) or 9. c) 9. d)

Syllabus Distribution for Question Paper Setting		
Major Paper / Elective Paper with 3 credits		
Part A	12 Questions, each carrying 2 marks	3 questions from each unit
Part B	4 questions, 1 main Question from each unit carrying 15 marks	Each 15-mark question shall have internal choice within the same unit only. Each main question may contain maximum of 3 sub questions
Compulsory Paper with 2 credits		
Part A	6 Questions, each carrying 2 marks	2 Questions from each unit
Part B	3 Questions, 1 main Question from each unit carrying 10 marks	Each 10-mark question shall have internal choice within the same unit only. Each main question may contain maximum of 2 sub questions

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