S–2374	Sub. Code
	23BCA1C1

B.C.A. DEGREE EXAMINATION, APRIL 2026

First Semester

Computer Application

PYTHON PROGRAMMING

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** the questions.

1. Differentiate between literals and variables in Python.

2. What is type conversion in Python? Give one example.

3. Write the syntax of an if-elif-else statement.

4. What is the purpose of the continue statement in loops?

5. Define recursion with an example in Python.

6. What does the dir() function return?

7. How do you access an element from a nested list?

8. Give one example for creating a tuple.

9. What does the append() method do in file handling?

10. Mention the use of the readlines() method in Python.

Part B (5 × 5 = 25)

Answer **all** the questions, choosing either (a) or (b).

11. (a) Explain different types of operators in Python with example.

Or

(b) Discuss constants, identifiers and keywords in Python with examples.

12. (a) Explain the working of a while loop with an example.

Or

(b) Write a Python program using nested if-else to find the largest of three numbers.

13. (a) Explain variable scope and lifetime with an example.

Or

(b) Describe any five string in built functions in Python with suitable examples.

14. (a) Write a Python program to update and delete elements in a list.

Or

(b) Explain dictionary methods with suitable examples.

15. (a) Write short notes on file renaming and deleting files in Python.

Or

(b) Explain how with keyword is used in file handling.

Part C (3 × 10 = 30)

Answer any **three** of the following.

16. Discuss the features of Python that make it suitable for application development.

17. Explain the different types of control structures in Python with examples.

18. Explain function definition, arguments, return values, and variable scope in Python.

19. Compare lists, tuples and dictionaries in Python, explaining their properties, operations and use cases.

20. Explain the various file modes in Python and describe how files are created, opened, read, written and closed.

S–2375

Sub. Code
23BCAA1

U.G. DEGREE EXAMINATION, APRIL 2026

Computer Application

Allied – DIGITAL LOGIC FUNDAMENTALS

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer the following.

1. List the universal gates.

2. Convert $(1010)_2$ into decimal.

3. Perform the binary addition of 1011 and 1101.

4. Define implicant.

5. Define multiplexer.

6. Explain code conversion.

7. Define flip-flop.

8. Explain the function of a shift register.

9. Explain the function of a ring counter.

10. Define synchronous counter.

Part B (5 × 5 = 25)

Answer the following, choosing either (a) or (b).

11. (a) Demonstrate binary code conversion with suitable examples.

Or

(b) Differentiate between AND, OR and NOT gates.

12. (a) Simplify Boolean expressions using theorems.

Or

(b) Evaluate expressions using the implicant method.

13. (a) Illustrate the working of demultiplexers with a neat diagram.

Or

(b) Analyze code converters with suitable examples.

14. (a) Summarize the working of the JK flip-flop.

Or

(b) Explain the master-slave flip-flop with a diagram.

15. (a) Compare ripple and ring counters.

Or

(b) Evaluate asynchronous counters with examples.

Part C (3 × 10 = 30)

Answer any **three** of the following.

16. Design truth tables for universal gates and justify their use.

17. Analyze binary arithmetic operations and construct adder-subtractor circuits.

18. Evaluate the role of parity generators and checkers in digital systems.

19. Illustrate the operation of different shift registers and assess their applications.

20. Differentiate ROMs and RAMs and justify their types with applications.

———————

S–2376

Sub. Code
23BCA1S1

B.C.A. DEGREE EXAMINATION, APRIL 2026

First Semester

Computer Applications

WEB DESIGNING

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. What is the use of and<hr> tag?

2. Write down the syntax of a hyperlink tag.

3. Name the types of image maps.

4. What is textarea in form?

5. How to use CSS selector in webpage?

6. State the purpose of XML.

7. Give a short notes on event bubbling.

8. What is mean by client side scripting?

9. What is the use of object in JavaScript?

10. Define form validation?

Part B (5 × 5 = 25)

Answer **all** questions choosing either (a) or (b).

11. (a) Explain about paragraph and line break tags with examples.

Or

(b) Describe frames in HTML with examples.

12. (a) Explain list box and combo box in HTML forms.

Or

(b) Discuss the various tools used for building web pages.

13. (a) Narrate the concept of adding CSS to webpages.

Or

(b) Differentiate between the XML and HTML.

14. (a) Explain DOM tree structure with an example.

Or

(b) Illustrate looping and repetition statements in JavaScript with examples.

15. (a) Explain the use of JavaScript in the Web browser environment.

Or

(b) Outline the concept of window and document objects.

Part C

(3 × 10 = 30)

Answer any **three** questions.

16. Explain lists in HTML with its types.

17. Design a HTML form for collecting user information using various from controls and explain each.

18. Discuss DHTML and CSS in detail and also analyze the role of CSS in dynamic WebPages.

19. Describe dynamic content, styles and positioning in DHTML with examples.

20. Outline the interaction between JavaScript, DOM and form validation with example.

———————

S–2377

Sub. Code
23BCA1FC

B.C.A. DEGREE EXAMINATION, APRIL 2026

First Semester

Computer Applications

STRUCTURED PROGRAMMING IN C

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. How will you declare a variable in C? Give example.

2. What are the types of constants?

3. Point out the example of simple if statement.

4. Write a note on for loop statement.

5. Define “Arrays”.

6. What is multidimensional arrays?

7. Write down the form of C functions.

8. How will you declare a string? Give example.

9. What are the advantages of pointers?

10. Give the example of pointer expressions.

Part B (5 × 5 = 25)

Answer **all** the questions, choosing either (a) or (b).

11. (a) Describe the basic structure of C program.

Or

(b) Explain the character set used in C program.

12. (a) Differentiate between do while loop and while loop statement in C.

Or

(b) What are the uses of jumps in loops? Explain.

13. (a) How are the one-dimensional array elements read and written?

Or

(b) Elaborate the initializing two dimensional arrays with example.

14. (a) Demonstrate the category of functions in C.

Or

(b) What are the various types of string handling functions? Explain.

15. (a) Summarize the pointers increments and scale factor.

Or

(b) How the pointer variable declared and initialized? Give example.

Part C

(3 × 10 = 30)

Answer any **three** questions.

16. What are the basic data types available in C language? Give examples.

17. Illustrate the concept of Else IF ladders with example.

18. How will you declare a multidimensional arrays? Give example.

19. Formulate the syntax and example of nesting of functions.

20. Write a C program to find the biggest among given three numbers.

———————

S–2378

Sub. Code
23BCA2C1

B.C.A. DEGREE EXAMINATION, APRIL 2026

Second Semester

Computer Application

OBJECT ORIENTED PROGRAMMING CONCEPTS USING C++

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A ($10 \times 2 = 20$)

Answer **all** questions.

1. List any four advantages of object-oriented programming.
2. Differentiate while and do.. while loop statements in C++.
3. Define a class in C++. How is it different from a structure?
4. What is a constructor? Give one example.
5. What is operator overloading? Give an example operator that can be overloaded.
6. Differentiate between function overloading and operator overloading.
7. What is the purpose of 'this' pointer?
8. What is the difference between base class and derived class?
9. List any two file modes in C++.
10. What is exception handling? Name the three keywords used in it.

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Explain the key features of Object-Oriented Programming.

Or

(b) Write a C++ program using switch to display the day of the week.

12. (a) Illustrate static data members and static member functions with an example.

Or

(b) Write a program to demonstrate the use of constructors and destructors.

13. (a) Describe single and multiple inheritance with suitable examples.

Or

(b) Explicate function overloading in C++ with a program.

14. (a) Analyze memory allocation using new and delete with examples.

Or

(b) Write a program to demonstrate polymorphism using virtual functions.

15. (a) Write a program to read and write student details to a file.

Or

(b) Demonstrate the use of templates in C++ with an example.

Part C

(3 × 10 = 30)

Answer any **three** questions.

16. Explain in detail the various control statements in C++ with examples.

17. Discuss arrays of objects with an example program.

18. Explicate different types of inheritance in C++ with diagrams and examples.

19. Write a program in C++ to overload the + operator to add two complex numbers.

20. Write a program in C++ to handle divide-by-zero using exception handling.

———————

S–2379

Sub. Code
23BCAA2

B.C.A. DEGREE EXAMINATION, APRIL 2026

Computer Application

Allied – RESOURCE MANAGEMENT TECHNIQUES

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. What is the use of Operation Research?

2. Write the standard form of a Linear Programming Problem.

3. What are the different methods used to find the initial basic feasible solution of a transportation problem?

4. What is an unbalanced transportation problem?

5. State any two applications of assignment problems in real life.

6. What is balanced assignment Problem.

7. What is a sequencing problem?

8. State two assumptions of sequencing problems.

9. Define Critical Path.

10. Write any two rules of network construction.

Part B (5 × 5 = 25)

Answer **all** the questions, choosing either (a) or (b).

11. (a) Describe the scope of the Operations Research.

Or

(b) A firm manufactures two types of products A and B and sells them at a profit of Rs. 2 on type A and Rs. 3 on type B. Each product is processed on two machines M_1 and M_2. Type A requires 1 minute of processing time on M_1 and 2 minutes on M_2. Type B requires 1 minute on M_1 and 1 minute on M_2. Machine M_1 is available for not more than 6 hours 40 minutes while machine M_2 is available for 10 hours during any working day. Formulate the problem as LPP so as to maximize the profit.

12. (a) Determine initial basic feasible solution to the following transportation problem using North -West Corner Rule:

		A	B	C	D	E	Supply
	P	2	11	10	3	7	4
Origin	Q	1	4	7	2	1	8
	R	3	9	4	8	12	9
Demand		3	3	4	5	6	
Destination							

Or

(b) Find the initial solution to the following transportation problem using VAM.

	D	E	F	G	Available
A	11	13	17	14	250
B	16	18	14	10	300
C	21	24	13	10	400
Demand	200	225	275	250	

13. (a) The assignment cost of assigning any one operator to any one machine is given in the following table. Find the optimal assignment by Hungarian Method.

Machine	Operators I	II	III	IV
A	10	5	13	15
B	3	9	18	3
C	10	7	3	2
D	5	11	9	7

Or

(b) Solve the following assignment problem for minimization.

	I	II	III	IV
A	10	12	19	11
B	5	10	7	8
C	12	14	13	11
D	8	15	11	9

14. (a) Six jobs go first over machine I and then over machine II. The order of the completion of jobs has no significance. The following table gives the machine time in hours for six jobs and the two machines.

Job No.	1	2	3	4	5	6
Time on Machine I	5	9	4	7	8	6
Time on Machine II	7	4	8	3	9	5

Find the sequence of jobs that minimizes the total elapsed time to complete the jobs and the idle time on machine I and machine II.

Or

(b) There are five jobs, each of which must go through the machines A, B and in the order ABC. Determine the sequence that will minimize the total elapsed time.

Job No.	1	2	3	4	5
Machine A	5	7	6	9	5
Machine B	2	1	4	5	3
Machine C	3	7	5	6	7

15. (a) Bring out the fundamental differences between CPM and PERT.

Or

(b) Construct the network for the project whose activities and the three-time estimates of these activities (in weeks) are given below. Compute the following:

(i) Expected Duration of each activity

(ii) Expected variance of each activity.

Activity	t_o	t_m	t_p
1-2	3	4	5
2-3	1	2	3
2-4	2	3	4
3-5	3	4	5
4-5	1	3	5
4-6	3	5	7
5-7	4	5	6
6-7	6	7	8
7-8	2	4	6
7-9	1	2	3
8-10	4	6	8
9-10	3	5	7

Part C (3 × 10 = 30)

Answer any **three** of the following questions.

16. Solve by Graphical method, the following LPP.

Max $Z = 4X_1 + 3X_2$

Subject to $2X_1 + X_2 < 1000$

$X_1 + X_2 < 800$

$0 < X_1 < 400$

$0 < X_2 < 700$ and $X_1, X_2 \geq 0$.

17. Solve the following transportation problem and find the optional solution.

		Destination				
		I	II	III	IV	Supply
Source	A	21	16	25	13	11
	B	17	18	14	23	13
	C	32	27	18	41	19
	Demand	6	10	12	15	

18. Three Jobs A, B, C are to be assigned to three machine X, Y, Z. The processing costs as give in the matric shown below. Find the allocation which will minimum the overall cost.

	Machines			
		X	Y	Z
Jobs	A	19	28	31
	B	11	17	16
	C	12	15	13

19. Use graphical method to minimize the time needed to process the following jobs on the machines shown below, i.e., for each machine find the job that should be done first. Also calculate the total time needed to complete both the jobs.

Job 1	Sequence of machine	A	B	C	D	E
	Time	2	3	4	6	2
Job 2	Sequence of machine	C	A	D	E	B
	Time	4	5	3	2	6

20. Calculate the total float, free float and independent float for the project whose activities are given below and find the critical path:

Activity	1-2	1-3	1-5	2-3	2-4
Duration (in weeks)	8	7	12	4	10
Activity	3-4	3-5	3-6	4-6	5-6
Duration (in weeks)	3	5	10	7	4

S–2380

Sub. Code
23BCA2S1

B.C.A. DEGREE EXAMINATION, APRIL 2026

Second Semester

Computer Application

FUNDAMENTALS OF INFORMATION TECHNOLOGY

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. Define hardware with two examples.

2. Name two output devices.

3. What is the purpose of headers in Word?

4. State two text manipulation operations in Word.

5. Define worksheet in Excel.

6. Mention two uses of a chart in Excel.

7. What is a slide transition?

8. Name any two multimedia objects in PowerPoint.

9. What is a domain name? Give an example.

10. Define e-commerce.

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Explain the difference between software and hardware.

Or

(b) List and describe various input and output devices.

12. (a) Illustrate the steps involved in inserting images and objects in Word.

Or

(b) Summarize the process of Mail Merge with an example.

13. (a) Explicate generating series and functions in Excel.

Or

(b) Compare different types of charts available in Excel.

14. (a) Describe the slide views in PowerPoint with neat illustrations.

Or

(b) Elaborate the process of creating user-defined templates.

15. (a) Analyze the differences between Internet and Intranet.

Or

(b) Illustrate the steps of sending an e-mail with attachments.

Part C

$(3 \times 10 = 30)$

Answer any **three** questions.

16. Describe the growth of computers through generations and their characteristics.

17. Evaluate the role of formatting and object insertion in preparing professional Word documents.

18. Demonstrate with examples how data can be managed using Excel formulas, functions and charts.

19. Justify the need for PowerPoint in professional and academic communication

20. Discuss in detail Internet services such as browsers, search engines and e-mail communication

S–2381

Sub. Code
23BCA2S2

B.C.A. DEGREE EXAMINATION, APRIL 2026

Second Semester

Computer Application

MULTIMEDIA SYSTEMS

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. Define Multimedia.

2. What is hypertext?

3. What is an image file format? Give one example.

4. Expand MIDI Audio vs Digital Audio.

5. Define animation.

6. What is a digital video container?

7. What are the stages of a multimedia project?

8. Define authoring systems.

9. What is scheduling in multimedia project planning?

10. Mention the process of Designing.

Part B (5 × 5 = 25)

Answer **all** questions choosing either (a) or (b).

11. (a) Explain the importance of delivering multimedia content.

Or

(b) Write short notes on hypermedia with an examples.

12. (a) Explain the power of sound in multimedia systems.

Or

(b) Differentiate between MIDI and digital audio.

13. (a) Explain the shooting and editing of video:

Or

(b) Explain the principles of animation.

14. (a) Explain the hardware needs of multimedia projects.

Or

(b) Write short notes on software requirement for multimedia development.

15. (a) Explain the process of planning in multimedia development.

Or

(b) Write short notes on content acquisition.

Part C

$(3 \times 10 = 30)$

Answer any **three** questions.

16. Discuss in detail the definition, use, and components of multimedia.

17. Explain in detail about image file formats and their importance.

18. Discuss the importance of animation and explain how animations are created for multimedia.

19. Discuss the different stages of multimedia projects in detail.

20. Discuss ownership of content and its role in multimedia project development.

———————

S–2382

Sub. Code
23BCAA3

U.G. DEGREE EXAMINATION, APRIL 2026

Computer Application

Allied – DISCRETE MATHEMATICS

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** the questions.

1. What is a singleton set?

2. Define symmetric relation.

3. What is negation of a statement?

4. Define tautology.

5. What is CNF?

6. Define valid formula.

7. What is null graph?

8. Define complete graph.

9. Write the algorithms used to find minimal spanning tree.

10. What is Boolean function?

Part B (5 × 5 = 25)

Answer **all** the questions, choosing either (a) or (b).

11. (a) Discuss composition of functions with example.

Or

(b) Discuss power sets and complements with examples.

12. (a) Describe about well-formed formulae.

Or

(b) Construct the truth table for $(Q \wedge (P \to Q)) \to P$.

13. (a) Show that
$\forall x(P(x) \to Q(x)) \wedge \forall x(Q(x) \to R(x)) \Rightarrow \forall x(P(x) \to R(x))$.

Or

(b) Discuss open statement with example.

14. (a) Write short notes on simple graph and subgraphs with example.

Or

(b) Define Graph. How to find the degree of vertices in a graph? Give an example.

15. (a) Prove absorption law of Boolean algebra.

Or

(b) Find minimal spanning tree using Kruskal's algorithm with an example.

Part C

(3 × 10 = 30)

Answer any **three** of the following questions.

16. Define Set. Explain its operations with examples.

17. Discuss the various connectives in logic with examples.

18. Show that $(\exists x)(P(x) \wedge Q(x)) \Rightarrow (\exists x)P(x) \wedge (\exists x)Q(x)$.

19. Discuss the various matrix representations of a graph with examples.

20. Elaborate the Dijkstra's algorithm with an example.

———————

S–2383

Sub. Code
23BCAA4

U.G. DEGREE EXAMINATION, APRIL 2026

Computer Application

Allied – STATISTICS METHODS AND ITS APPLICATIONS

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. Define primary data.

2. What is meant by classification of data?

3. State the formula for harmonic mean.

4. Write any two merits of mode.

5. Define absolute measure of dispersion.

6. What is meant by Lorenz curve?

7. Define kurtosis.

8. Distinguish between raw moments and central moments.

9. Define correlation.

10. State two limitations of regression analysis.

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Explain the scope and limitations of statistics.

Or

(b) What are the different methods of diagrammatic and graphical representation of data?

12. (a) Calculate the median for the following data:

Class:	0-10	10-20	20-30	30-40	40-50
Frequency:	4	10	16	8	2

Or

(b) Write short notes on geometric mean and its applications.

13. (a) Define standard deviation. Explain the computation steps with a simple example.

Or

(b) Compute the quartile deviation and its coefficient for the following data:

10, 15, 20, 25, 30, 35, 40, 45, 50.

14. (a) Explain Bowley's coefficient of skewness with an example.

Or

(b) Write notes on the importance of moments in statistics.

15. (a) Explain the types of correlation with suitable diagrams.

Or

(b) Write the procedure to calculate Spearman's rank correlation coefficient.

Part C

(3 × 10 = 30)

Answer any **three** questions.

16. Explain different methods of collection of statistical data with examples.

17. From the following data, calculate the mean using step-deviation method:

Class:	0-10	10-20	20-30	30-40	40-50
Frequency:	6	8	15	16	5

18. Calculate the coefficient of variation for the following distribution:

X :	10	20	30	40	50
F :	5	10	20	10	5

19. Find Karl Pearson's coefficient of correlation for the following data:

X :	10	20	30	40	50
Y :	15	25	35	45	55

20. From the following data, obtain both regression equations and estimate X when Y = 25 :

X :	5	10	15	20	25
Y :	7	12	17	22	27

S–2384

Sub. Code
23BCAA5

U.G. DEGREE EXAMINATION, APRIL 2026

Computer Application

Allied – GRAPH THEORY AND ITS APPLICATIONS

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. What is a circuit?

2. What is the centre of a tree?

3. Define 2-Isomorphism.

4. What is network flow?

5. State the four colour problem.

6. What is a digraph?

7. Define adjacency matrix of a graph.

8. Define weighted graph.

9. What is shortest path problem?

10. Define k-colouring.

Part B (5 × 5 = 25)

Answer **all** questions choosing either (a) or (b).

11. (a) Explain Hamiltonian paths circuits with example.

Or

(b) Discuss connected and disconnected graphs with examples.

12. (a) Describe about cut-sets with an example.

Or

(b) Sketch the concept of planar graphs with example.

13. (a) Explain the four-colour problem with example.

Or

(b) Write short notes on matching and covering.

14. (a) Explain spanning trees of connected relations.

Or

(b) Describe Prim's algorithm with an example.

15. (a) Solve a shortest path problem for a given directed graph using Dijkstra's algorithm.

Or

(b) Explain application of spanning trees in network design.

Part C

(3 × 10 = 30)

Answer any **three** questions.

16. Define trees. Explain the properties of trees with examples.

17. Write detailed notes on isomorphism in graphs.

18. Define the following with example:

    (a) Chromatic number

    (b) Chromatic Partitioning

    (c) Euler's Graph

    (d) Directed paths

19. Explain how to represent graphs in matrix forms. Give examples.

20. Elaborate Travelling Salesman Problem with an example.

———————

S–2385

Sub. Code
23BCAA6

U.G. DEGREE EXAMINATION, APRIL 2026

Computer Application

Allied – COMPUTER ORIENTED NUMERICAL METHODS

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. Write the iterative formula for Bisection method.
2. State the principle behind the Gauss elimination method.
3. What is the stopping criterion in Newton—Raphson method?
4. Give any two differences between Jacobi's and Gauss—Seidel methods.
5. Define Newton's divided difference formula.
6. State the significance of equal interval interpolation.
7. What is numerical integration?
8. Give the formula for Simpson's 3/8 rule.
9. What is the main idea of Taylor's series method in ODE solving?
10. Define single-step and multi-step methods in numerical analysis.

Part B (5 × 5 = 25)

Answer **all** questions choosing either (a) or (b).

11. (a) Explain Newton—Raphson method with an example problem.

Or

(b) Solve $x^3 - 2x - 5 = 0$ using one iteration of the Bisection method.

12. (a) Solve a system of equations using Gauss elimination method.

Or

(b) Discuss the convergence condition for Gauss—Seidel method with example.

13. (a) Derive Newton's divided difference interpolation formula.

Or

(b) Use Lagrange's interpolation to find y at a given value of x.

14. (a) Explain the procedure for finding derivatives using Newton's forward difference formula.

Or

(b) Apply Trapezoidal rule to approximate $\int_0^{\pi/2} \sin x \, dx$

15. (a) Use Euler's method to solve $y' = x^2 + y,\ y(0) = 1$ for one step with $h = 0.1$.

Or

(b) Describe Runge–Kutta 4th order method with steps.

Part C

(3 × 10 = 30)

Answer any **three** questions.

16. Using Bisection method, find a root of $x^3 + x - 1 = 0$ correct to three decimal places.

17. Solve a 3×3 system of equations using Jacobi's method.

18. Apply Newton's forward interpolation formula to find y for given data.

19. Evaluate $\int_0^1 (1 + x^2)dx$ using Simpson's 1/3 rule and compare with exact value.

20. Solve $y' = y - x^2$, $y(0) = 1$ using Runge–Kutta method of order 4 with h=0.2.

———————

S–2386

Sub. Code
23BCA3C1

B.C.A. DEGREE EXAMINATION, APRIL 2026

Third Semester

Computer Application

DATA STRUCTURES AND ALGORITHMS

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. What are circular linked lists?

2. Mention two applications of linked lists.

3. Define priority queue.

4. What is the role of stack in function calls?

5. Define B-tree.

6. Differentiate between binary search tree and AVL tree.

7. Define a graph.

8. What is biconnectivity?

9. State the best-case time complexity of binary search.

10. List out the differences between separate chaining and rehashing in hashing.

Part B (5 × 5 = 25)

Answer **all** questions choosing either (a) or (b).

11. (a) Describe the linked list implementation of a list ADT.

Or

(b) Explain merge operation on two linked lists with example.

12. (a) Illustrate the stack applications in expression evaluation.

Or

(b) Write short notes on double-ended queue (deque).

13. (a) Write an algorithm for constructing a binary search tree and insert the keys: 15, 10, 14, 20, 25, 8, 12.

Or

(b) Enumerate the heap and its applications.

14. (a) Write and explain the algorithm for Depth First Search (DFS).

Or

(b) Explain cut vertices and their applications in graphs.

15. (a) Write an algorithm for quick sort and explain with example.

Or

(b) Discuss the extendible hashing with an example.

Part C

(3 × 10 = 30)

Answer any **three** questions.

16. Elucidate polynomial manipulation using linked lists with suitable examples.

17. Write brief note on the operations of a circular queue with diagrams.

18. Explain in detail the operations of B-trees with example.

19. With an example, explain Euler circuits in detail.

20. Explain the working of radix sort and analyze its time complexity.

———————

S–2387

Sub. Code
23BCA3S1

B.C.A. DEGREE EXAMINATION, APRIL 2026

Third Semester

Computer Applications

SOFTWARE TESTING

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** the questions.

1. What is software testing?

2. Write a note on software quality.

3. Define “Flow Graph”.

4. What is path testing?

5. Recall the need of input domain.

6. Comment on domain error.

7. Relate the use of path product.

8. What do you mean by test case?

9. State the advantages of logic based testing.

10. What is a decision table?

Part B (5 × 5 = 25)

Answer **all** the questions choosing either (a) or (b).

11. (a) Identify the importance of testing in the software development life cycle

Or

(b) Differentiate between the testing and debugging.

12. (a) Highlight the steps to path testing improves test coverage?

Or

(b) Explain the basic concept of achievable paths.

13. (a) Point out the domains and paths in domain testing.

Or

(b) Enumerate the boundary value analysis in domain testing.

14. (a) Summarize the importance of metrics in software testing.

Or

(b) Elucidate the procedure for syntax testing.

15. (a) Describe the applications of transition testing.

Or

(b) Express the concepts of states and state graphs.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Examine the various types of testing and design styles.

17. Assume the path instrumentation with suitable example.

18. Integrate the need and significance of interface testing.

19. Compare and construct the path products and path expressions.

20. Estimate the implementation of transition testing.

———————

S–2388

Sub. Code
23BCA3S2

B.C.A. DEGREE EXAMINATION, APRIL 2026

Third Semester

Computer Application

BIOMETRICS

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all the** questions.

1. Define biometrics traits with suitable examples.

2. Identify the role of feature extraction in biometrics.

3. Explain the significance of biometric system error rates.

4. List any two challenges in face recognition.

5. Define iris recognition system.

6. Explain the concept of vein pattern recognition.

7. Define soft biometrics with examples.

8. Summarize the need for multimodal biometrics.

9. List any two applications of data hiding methods in biometrics.

10. Describe the future role of DNA biometrics.

Part B (5 × 5 = 25)

Answer **all** the questions choosing either (a) or (b).

11. (a) Apply the design principles of a biometric system with block diagram.

Or

(b) Explain the advantages and disadvantages of biometric systems.

12. (a) Apply the design of iris recognition system for authentication.

Or

(b) List out the limitations of retina and iris biometrics.

13. (a) Demonstrate privacy enhancement in biometric deployments.

Or

(b) Examine the comparison of biometrics in terms of privacy.

14. (a) Describe the multimodal biometric fusion techniques for recognition.

Or

(b) Evaluate the architecture and characteristics of multimodel biometrics

15. (a) Explain the general watermarking algorithms to biometric systems.

Or

(b) List out the effects of attacks on watermarking techniques.

Part C $(3 \times 10 = 30)$

Answer any **three** questions.

16. Evaluate the scope and future market of biometrics.

17. Assess the role of biometrics in enterprise security and border control.

18. Develop a model for RFID and DNA-based biometric authentication.

19. Critically evaluate the role of biometric standards and API interoperability.

20. Propose an integrated system combing watermarking and multimodel biometrics.

———————

S–2389

Sub. Code
23BCA4C1

B.C.A. DEGREE EXAMINATION, APRIL 2026

Fourth Semester

Computer Application

PROGRAMMING IN JAVA

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** the questions.

1. List any two features of Java.

2. Define type casting with example.

3. What is method overloading?

4. Differentiate between abstract class and interface.

5. Write the use of synchronized keyword.

6. List any two character stream classes.

7. Name two AWT components.

8. What is an event source in Java?

9. Define JFrame.

10. Write any two differences between Swing and AWT.

Part B (5 × 5 = 25)

Answer **all** questions choosing either (a) or (b).

11. (a) Illustrate the JVM architecture.

Or

(b) Discuss the scope and lifetime of variables in Java.

12. (a) Write Java program to demonstrate method overriding.

Or

(b) Write short notes on packages in Java.

13. (a) Write a Java program to demonstrate thread synchronization.

Or

(b) Discuss file handling using byte streams.

14. (a) Explain the hierarchy of AWT classes.

Or

(b) Describe the event delegation model with suitable example.

15. (a) List and explain any five Swing components.

Or

(b) Discuss the hierarchy of Swing containers.

Part C

(3 × 10 = 30)

Answer any **three** questions.

16. Discuss in detail the various data types, operators and control statements in Java with examples.

17. Explain the different types of inheritance with examples.

18. Write brief note on inter-thread communication and deadlock with examples.

19. Write a Java program to draw human face using AWT controls.

20. Write short notes on Swing text-based components with examples.

———————

S–2390

Sub. Code
23BCA4S1

B.C.A. DEGREE EXAMINATION, APRIL 2026

Fourth Semester

Computer Application

PHP PROGRAMMING

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. What is meant by dynamic website?

2. Mention the role of Apache in XAMPP.

3. How do you embed PHP in HTML?

4. What is a PHP variable?

5. Write two differences between while and for loop.

6. Define associative array.

7. How do you read data from a file in PHP?

8. What is the use of fread()?

9. Define a cookie in PHP.

10. How do you destroy a session?

Part B (5 × 5 = 25)

Answer **all** questions choosing either (a) or (b).

11. (a) Describe the components of XAMPP.

Or

(b) Explain how PHP integrates with MySQL in a server setup.

12. (a) What are the rules for naming variables in PHP? Give examples.

Or

(b) Discuss about if() and elseif() statement with examples.

13. (a) Describe switch() statement in PHP with an example.

Or

(b) Write a PHP script to display the factorial of a number using for() loop.

14. (a) Write a PHP program to check if a file exists or not.

Or

(b) Write a script that appends content to a file.

15. (a) Explain the concept of sessions with an example.

Or

(b) How do you create and read cookies in PHP?

Part C

(3 × 10 = 30)

Answer any **three** questions.

16. Elaborate the architecture of a dynamic website using PHP.

17. Discuss the various operators in PHP with suitable examples.

18. Write a detailed note on arrays in PHP with examples.

19. Discuss in detail about different file operations in PHP.

20. Compare session Vs cookies in detail with suitable examples.

———————

S–2391

Sub. Code
23BCA4S2

B.C.A. DEGREE EXAMINATION, APRIL 2026

Fourth Semester

Computer Application

CYBER FORENSICS

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. Define computer forensics.

2. Mention any two benefits of professional forensic methodology.

3. Define data recovery.

4. Define chain of custody.

5. Define duplication of digital evidence.

6. Mention two legal aspects in preserving evidence.

7. Define electronic evidence.

8. What is time travel in forensic analysis?

9. What is network forensics scenario?

10. Mention two methods to convert files.

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Analyze the benefits of computer forensics in law enforcement.

Or

(b) Illustrate the role of computer forensic specialists.

12. (a) Analyze evidence collection challenges.

Or

(b) Apply collection and archiving procedures for digital evidence.

13. (a) Apply computer image verification techniques.

Or

(b) Analyze the practical considerations in authentication.

14. (a) Illustrate forensic analysis of technical surveillance devices.

Or

(b) Analyze the identification of data in forensic analysis.

15. (a) Explain the steps to become a digital detective.

Or

(b) Apply file conversion methods in forensic investigation.

Part C

(3 × 10 = 30)

Answer any **three** of the following.

16. Illustrate the various types of computer forensics applications.

17. Create a data recovery plan for a corrupted system.

18. Evaluate the significance of digital evidence duplication.

19. Analyze the challenges of identifying electronic evidence.

20. Design a forensic case study for reconstructing past events.

———————

S–2392

Sub. Code
23BCA5C1

B.C.A. DEGREE EXAMINATION, APRIL 2026

Fifth Semester

Computer Application

OPERATING SYSTEMS

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. What is multiprogramming?

2. Define context switching.

3. State the critical section problem.

4. Mention two uses of monitors.

5. Define deadlock detection.

6. List any two deadlock recovery methods.

7. What is non-preemptive scheduling?

8. Define multilevel feedback queue scheduling.

9. Differentiate between contiguous and non-contiguous memory allocation.

10. What is page fault?

Part B (5 × 5 = 25)

Answer **all** questions choosing either (a) or (b).

11. (a) Describe the different process states with a neat diagram.

Or

(b) Explain inter-process communication using message passing.

12. (a) Summarize the software solutions to the critical section problem.

Or

(b) Classify the implementation of monitors.

13. (a) Illustrate deadlock avoidance using Banker's Algorithm.

Or

(b) Compare resource allocation graph with wait-for graph in deadlock handling.

14. (a) Explicate HRN and SRT scheduling algorithms with examples.

Or

(b) Analyze the advantages and disadvantages of preemptive scheduling.

15. (a) Outline memory management strategies in contiguous and non-contiguous allocation.

Or

(b) Examine segmentation and its role in memory management.

Part C

(3 × 10 = 30)

Answer any **three** questions.

16. Describe the evolution of operating systems and their impact on modern computing.

17. Evaluate Peterson's algorithm and Lamport's Bakery algorithm for process synchronization.

18. Analyze the causes of deadlock and propose recovery mechanisms with examples.

19. Critically assess different CPU scheduling algorithms with suitable examples and case studies.

20. Elaborate the advantages and disadvantages of demand paging compared to traditional memory management.

———————

S–2393

Sub. Code
23BCA5C2

B.C.A. DEGREE EXAMINATION, APRIL 2026

Fifth Semester

Computer Application

ASP.NET PROGRAMMING

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. Define namespace in C#.

2. Write the syntax for string concatenation in C#.

3. What is the use of the ASP.NET IDE?

4. What is the use of the ListBox control?

5. What does the File.Delete() method do?

6. Write one line of code to upload a file in ASP.NET.

7. Define data binding in ASP.NET.

8. Write the syntax for creating a SqlCommand.

9. Give one example of an XML element.

10. Mention any one step in creating a Web Application.

Part B (5 × 5 = 25)

Answer **all** questions choosing either (a) or (b).

11. (a) Write a program in C# to reverse a string.

Or

(b) Explain the use of while and for loops with examples.

12. (a) Explain the use of the Button control with suitable example.

Or

(b) Describe the properties of the CheckBox control in ASP.NET.

13. (a) Write a program to upload a file in ASP.NET.

Or

(b) Explain different file modes in FileStream with examples.

14. (a) Discuss the steps to create and use a DataSet in ADO.NET.

Or

(b) Explain the process of data binding in ASP.NET applications.

15. (a) Discuss the use of XML classes in ASP.NET with examples.

Or

(b) Write short notes on creating a simple Web Application for arithmetic operation in ASP.NET.

Part C

(3 × 10 = 30)

Answer any **three** questions.

16. Discuss the different conditional statements in C# with programs.

17. Explain List controls and their properties in ASP.NET.

18. Write detailed notes on file uploading in ASP.NET with examples.

19. Discuss different ways to retrieve and manipulate data using DataReader and DataAdapter.

20. Explain the process of creating a complete ASP.NET Web Application for student mark system.

———————

S–2394

Sub. Code
23BCA5E1

B.C.A. DEGREE EXAMINATION, APRIL 2026

Fifth Semester

Computer Application

Elective: DATABASE MANAGEMENT SYSTEM

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. Define database system.

2. Write any two basic building blocks of data models.

3. Define candidate key.

4. What is data dictionary?

5. List out any two types of SQL commands

6. Write a query to display employee names and salaries.

7. Define UNION and INTERSECT operators.

8. What is an outer join?

9. What are nested blocks in PL/SQL?

10. Mention any two transaction control statements in PL/SQL.

Part B (5 × 5 = 25)

Answer **all** questions choosing either (a) or (b).

11. (a) Illustrate the drawbacks of file system approach.

Or

(b) Write short notes on business rules in DBMS.

12. (a) Explain relational algebra operators with examples.

Or

(b) Discuss Codd's rules in detail.

13. (a) Enumerate the use of SELECT query with various clauses.

Or

(b) Write short notes on BCNF.

14. (a) Write a note on SQL subqueries with examples.

Or

(b) Describe the different types of SQL joins with examples.

15. (a) Explain cursor attributes with suitable examples.

Or

(b) Write a PL/SQL program using control structures (IF—ELSE).

Part C

(3 × 10 = 30)

Answer any **three** questions.

16. Write brief note on database system architecture with neat diagram.

17. Illustrate relational database model with integrity constraints.

18. Discuss SQL data manipulation operations with examples.

19. Explain various SQL functions (date, numeric, string) with examples.

20. Write brief note on embedded SQL and cursors, in PL/SQL.

———————

S–2396

Sub. Code
23BCA5E3

B.C.A. DEGREE EXAMINATION, APRIL 2026

Fifth Semester

Computer Application

Elective – INTERNET OF THINGS AND ITS APPLICATIONS

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. Define device-level energy issue in IoT.

2. What is IoT Strategic Research?

3. Give an example of an emerging industrial structure for IoT.

4. What is standards consideration in IoT?

5. What is meant by Functional View in IoT?

6. What is Deployment View?

7. Define Smart Objects.

8. Write one IoT application in Home Management.

9. What is meant by FP7 Projects in IoT?

10. Define Data Aggregation.

Part B (5 × 5 = 25)

Answer **all** questions choosing either (a) or (b).

11. (a) How do IoT infrastructure and Networks support applications? Explain in detail.

Or

(b) Write about the importance Commendations on IoT research topics.

12. (a) How does the international value chain influence IoT? Explain in detail.

Or

(b) Write about the need for building an IoT architecture.

13. (a) Describe the IoT Reference Model briefly.

Or

(b) Explain the need for Operating View in IoT systems.

14. (a) How is Value Creation supported by Smart Objects? Explain in detail.

Or

(b) Explain IoT applications in Retailing Industry.

15. (a) How is privacy ensured in IoT systems? Explain in detail.

Or

(b) Discuss Data Aggregation in IoT Smart Cities.

Part C

(3 × 10 = 30)

Answer any **three** questions.

16. Explain IoT Applications in detail with suitable case studies.

17. Analyze the concept of an international-driven global value chain in detail.

18. Explain the Functional, Information, Deployment, and Operational Views of IoT.

19. Analyze and explain IoT Value Creation from Big Data.

20. Discuss contributions of FP7 Projects in building IoT Privacy and Security.

———————

S–2398

Sub. Code
23BCA6C1

B.C.A. DEGREE EXAMINATION, APRIL 2026

Sixth Semester

Computer Application

COMPUTER NETWORKS

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. What is the purpose of reference models in networking?

2. Identify two examples of guided transmission media.

3. Define wireless LAN.

4. Name two advantages of communication satellites.

5. What is medium access control (MAC)?

6. State two uses of Bluetooth technology.

7. Mention two issues related to congestion control.

8. What is the role of IP addresses?

9. Define connection management in transport layer.

10. Name two protocols used in network security.

Part B (5 × 5 = 25)

Answer **all** questions choosing either (a) or (b).

11. (a) Describe ATM and Ethernet Networks with neat sketches.

Or

(b) Explain the theoretical basis for data communication.

12. (a) Explicate wireless transmission methods with diagrams.

Or

(b) Analyze the functions of the data link layers in the telephone system.

13. (a) Demonstrate the functions of sliding window protocol with an example.

Or

(b) Compare channel allocation in wired and wireless networks.

14. (a) Explain in detail the congestion control algorithms.

Or

(b) Summarize the working of Internet Control Protocols.

15. (a) Illustrate the working procedures of the Internet Transport Protocols (ITP).

Or

(b) Elaborate the functions of HTTP and DNS.

Part C

(3 × 10 = 30)

Answer any **three** questions.

16. Explain the OSI and TCP/IP reference models with comparison.

17. Evaluate the role of telephone systems in data communication networks.

18. Discuss multiple access protocols with suitable examples.

19. Describe the design issues of the network layer in computer networks.

20. Demonstrate with examples how exception handling is used in network security protocols.

———————

S–2399

Sub. Code
23BCA6C2

B.C.A. DEGREE EXAMINATION, APRIL 2026

Sixth Semester

Computer Application

DATA ANALYTICS USING R PROGRAMMING

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** the questions.

1. Define Big Data.

2. List any two features of R.

3. Differentiate between while loop and repeat loop in R.

4. Write the syntax of if-else statement in R.

5. What is a vector in R? Give an example.

6. How do you access elements of a vector in R?

7. What is a list in R?

8. Write the syntax for creating a factor in R.

9. What is the use of table ( ) function in R?

10. Mention any two differences between S3 and S4 objects in R.

Part B (5 × 5 = 25)

Answer **all** the questions, choosing either (a) or (b).

11. (a) Explain the characteristics of Big Data.

Or

(b) Describe the architecture of Hadoop in brief.

12. (a) Analyse the use of for loop in R with an example.

Or

(b) Discuss various arithmetic and logical operators in R.

13. (a) Explain any three vector functions in R with suitable examples.

Or

(b) Illustrate the concept of vector indexing in R.

14. (a) Write short notes on attributes of a list in R.

Or

(b) Explain factor levels in R with an example.

15. (a) Differentiate between S3 and S4 classes in R.

Or

(b) Explain the concept of generic functions in R.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Explain in detail the evolution of Big Data and its challenges.

17. Discuss the different control structures in R with examples.

18. Illustrate the creation, manipulation, and operations on vectors in R.

19. Explain in detail about lists and factors in R with examples.

20. Write notes on object-oriented programming in R with reference to S3 and S4 classes.

———————

S–2400

Sub. Code
23BCA6E1

B.C.A. DEGREE EXAMINATION, APRIL 2026

Sixth Semester

Computer Application

Elective : ARTIFICIAL INTELLIGENCE

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** the questions.

1. What is the scope of AI?

2. Define state space representation.

3. Mention two advantages of heuristic search.

4. What is the difference between informed and uninformed search?

5. Define random variable in probabilistic reasoning.

6. State two applications of Bayesian networks.

7. What is the role of transition model in MDP?

8. Define partially observable MDP.

9. Mention two techniques of adaptive dynamic programming.

10. Define reinforcement signal.

Part B (5 × 5 = 25)

Answer **all** the questions, choosing either (a) or (b).

11. (a) Describe the components of an AI system with neat examples.

Or

(b) Differentiate between strong AI and weak AI.

12. (a) Explain Best First Search with an example.

Or

(b) Illustrate the use of Game Search algorithms in AI.

13. (a) Summarize the applications of conditional probability in reasoning models.

Or

(b) Explicate Bayesian Inference with an example.

14. (a) Discuss the importance of value iteration in MDP.

Or

(b) Compare fully observable and partially observable MDPs.

15. (a) Elaborate direct utility estimation in reinforcement learning.

Or

(b) Outline the working of temporal difference learning.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Examine the evolution of AI and its applications in real-world domains.

17. Critically assess the efficiency of heuristic-based search techniques with examples.

18. Demonstrate the construction of Bayesian networks and perform inference on a sample problem.

19. Evaluate the advantages and limitations of policy iteration and value iteration methods in MDP.

20. Elaborate the effectiveness of reinforcement learning techniques such as Q-learning in modern AI.

———————

S–2401

Sub. Code
23BCA6E2

B.C.A. DEGREE EXAMINATION, APRIL 2026

Sixth Semester

Computer Application

Elective : FUZZY LOGIC

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. Define fuzzy set.

2. State any two properties of fuzzy sets.

3. Define composition of relations.

4. What is a tolerance relation?

5. Define membership function.

6. List any two features of the membership function.

7. Define defuzzification.

8. What are λ-cuts in fuzzy sets?

9. Define vehicle speed estimation.

10. Expand FABS and ABS.

Part B (5 × 5 = 25)

Answer **all** questions choosing either (a) or (b).

11. (a) Differentiate classical and fuzzy relations.

Or

(b) Apply the Cartesian product to the given fuzzy sets.

12. (a) Explain operations on crisp relations.

Or

(b) Analyze the equivalence relations in fuzzy systems.

13. (a) Classify fuzzy sets using membership values.

Or

(b) Explain rank ordering of membership values.

14. (a) Apply fuzzy rule formation in a simple system.

Or

(b) Compare the decomposition and aggregation of fuzzy rules

15. (a) Explain fuzzy logic applications in automotive braking.

Or

(b) Analyze the advantages of fuzzy logic in control systems.

Part C

(3 × 10 = 30)

Answer any **three** questions.

16. Create a fuzzy set model for temperature classification.

17. Design a fuzzy Cartesian composition for a given dataset

18. Analyze membership functions and their impact on fuzzy inference.

19. Design a fuzzy rule-based system for traffic light control.

20. Create a fuzzy model for vehicle speed estimation.

———————

S–2402

Sub. Code
23BCA6E3

B.C.A. DEGREE EXAMINATION, APRIL 2026

Sixth Semester

Computer Application

Elective – CLOUD COMPUTING

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. Define clients in cloud infrastructure.

2. What are cloud services? Give examples.

3. Define platform in cloud computing.

4. What are application services in cloud?

5. Mention two differences between classic deployment and Resource Manager in Azure.

6. What are the performance issues in cloud applications?

7. Write the steps in benchmarking in cloud applications.

8. Mention any two monitoring techniques in Azure Web Apps.

9. List out the application of cloud computing in health care industries.

10. Define blob storage.

Part B (5 × 5 = 25)

Answer **all** questions choosing either (a) or (b).

11. (a) What are the different types of cloud models? Describe it.

Or

(b) Write short note on virtualization and replication in cloud.

12. (a) Illustrate the content delivery services in cloud.

Or

(b) Discuss in detail the Windows Azure SQL database.

13. (a) Write short note on reference architecture for cloud architecture.

Or

(b) Describe any one data storage approaches in cloud design.

14. (a) Explain the various workload characteristics in cloud.

Or

(b) Write the key considerations for benchmarking methodology.

15. (a) Describe the potential uses of cloud in energy systems.

Or

(b) How cloud computing can be used in education.

Part C

(3 × 10 = 30)

Answer any **three** questions.

16. Write in detail the map reduce and software defined networking techniques in cloud.

17. Explain about the cloud stack and eucalyptus cloud software.

18. Write in detail the cloud application design methodologies.

19. Discuss the cloud security architecture with suitable diagram.

20. Elucidate the uses of cloud computing in transportation systems.

———————

S–2403

Sub. Code
23BCA6E4

B.C.A. DEGREE EXAMINATION, APRIL 2026

Sixth Semester

Computer Application

Elective – ARTIFICIAL NEURAL NETWORKS

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. Define activation function in neural networks.

2. What is a convex hull?

3. State the Perceptron Convergence Theorem.

4. Differentiate between feedforward and feedback networks.

5. What is Hebbian learning?

6. Define competitive learning.

7. What is a simple perceptron?

8. State one limitation of the perceptron model.

9. Write the learning rule of a multi-layer perceptron (MLP).

10. Define recurrent neural networks (RNN).

Part B (5 × 5 = 25)

Answer **all** questions choosing either (a) or (b).

11. (a) Explain the different types of activation functions used in ANN.

Or

(b) Discuss the concept of convex sets and linear separability in ANN.

12. (a) Write short notes on error correction learning with an example.

Or

(b) Explain Hebbian learning with a neat diagram.

13. (a) Explain the architecture of a single-layer perceptron with a suitable diagram.

Or

(b) Discuss the Modified Perceptron learning algorithm.

14. (a) Explain the structure and working of a Multi-Layer Perceptron (MLP).

Or

(b) Write a short note on Delta learning rule.

15. (a) Discuss the concept of Deep Learning and its applications.

Or

(b) Explain the role of Convolutional Neural Networks (CNN) in deep learning.

Part C

(3 × 10 = 30)

Answer any **three** questions.

16. Describe the feedforward and feedback neural network models with neat diagrams.

17. Explain in detail the various error correction learning methods.

18. Describe the Perceptron learning algorithm Apply it to solve a linearly separable problem.

19. Discuss the generalized delta learning rule in MLP with continuous perceptrons.

20. Explain Deep Belief Networks and Restricted Boltzmann machines in detail.

———————