21COAC101 Reg No : .....

CHOICE BASED CREDIT SYSTEM SEMESTER SCHEME

B.C.A. FIRST SEMESTER DEGREE EXAMINATION OCTOBER 2025

COMPUTER APPLICATIONS

Fundamentals of Computers

Duration:2 Hours **Max Marks:60**

PART A

Answer any FIVE questions: **(5×2= 10)**

1) What is a programming language?
2) List the generations of computer.
3) What is pseudocode?
4) What is CRT monitor?
5) Define Idempotent law in boolean algebra.
6) What is a NOR gate? Write its truth table.

PART B

Answer any FIVE questions : **(5×6= 30)**

7) Write a short note on various map method in boolen algebra.
8) Define Hardware and Software. Write down any three differences between hardware and software.
9) Convert the following octal numbers a) 456 b) 367 c) 574 to binary.
10) With a neat diagram, explain the functioning of ALU.
11) Write a note on a) flatbed scanner b) web cam
12) Using basic boolean theorem prove XY+XZ+YZ'=XZ+YZ'.

PART C

Answer any TWO questions : **(2×10= 20)**

13) Write an algorithm to find
    a) factorial of a given number b) largest of three numbers.
14) Simplify the following boolean function to a minimum number of literals.
    a) zx + zx'y b) (x+y)(x+y') c) zx + zx'y
15) Find1256 -378 using a) 9's complement b) 10's complement.

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21COAC102 Reg No : .....

CHOICE BASED CREDIT SYSTEM SEMESTER SCHEME

BCA FIRST SEMESTER DEGREE EXAMINATION OCTOBER 2025

COMPUTER APPLICATIONS

Programming in C - Theory

Duration:2 Hours **Max Marks:60**

PART A

Answer any FIVE questions: **(5×2= 10)**

1) What are string constants? Give an example.
2) What is conditional operator? Write its syntax.
3) What is the purpose of toupper function? Give an example.
4) What is recursion? Give examples.
5) Write the syntax of nested if-else in C.
6) How do you initialize a string variable in C? Give an example.

PART B

Answer any FIVE questions : **(5×6= 30)**

7) What are symbolic constants? Explain #define with syntax and example.
8) What is type casting? Explain its types with examples.
9) Explain linear search with example.
10) How do you create a structure within a structure? Explain with an example.
11. Write a C program to reverse a number and find the sum of individual digits. Also check for palindrome.
12. What is a control string? Explain with syntax and example.

PART C

Answer any TWO questions : **(2×10= 20)**

13. Explain with an example how do you read a single character and string using unformatted input functions.
14. Explain with example program and syntax a) break b) exit
15. Write note on a) pointer increment and scale factor b) pointer arrays

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24COAC101 Reg No : .....

CHOICE BASED CREDIT SYSTEM

B.C.A FIRST SEMESTER DEGREE EXAMINATION OCTOBER 2025

COMPUTER APPLICATIONS

Fundamentals of Computers

Duration:3 Hours **Max Marks:80**

I. Answer any FIVE of the following : **(5×2= 10 Marks)**

1. Name any two impact printers.
2. What is a touch screen?
3. Write any two applications of internet.
4. What is an application software? Give an example.
5. What is Duality Theoem?
6. Convert the octal 252 to binary.

II. Answer any FIVE of the following : **(5×6= 30 Marks)**

7. Differentiate between LCD and CRT monitors.
8. What is a system bus? Explain the different units of the system bus.
9. Write an algorithm to check whether the given number is
   a) positive or negative b) odd or even.
10. Draw a flow chart to a) find the factorial of a number b) add two numbers
11. What are the different logical gates? Explain.
12. Explain
    a) Distributive law b) Absorbtion law c) De Morgan's law in boolean algebra.

III. Answer any FOUR of the following : **(4×10= 40 Marks)**

13. Explain the communication between:
    a) Processor and memory b) Processor and I/O devices.
14. Convert the binary numbers a)10010 b) 110010 c)10110 to octal and decimal.

15. a) Explain any five characteristics of a good programming language.
    b) Write a note on high-level language.

16. What are the different phases of a program development life cycle? Explain with the help of a neat diagram.

17. Find 10010 - 11110 using 1's complement and 2's complement.

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24COAC102 Reg No : .....

CHOICE BASED CREDIT SYSTEM

B.C.A FIRST SEMESTER DEGREE EXAMINATION OCTOBER 2025

COMPUTER APPLICATIONS

Programming in C

Duration:3 Hours **Max Marks:80**

I. Answer any FIVE of the following : **(5×2= 10 Marks)**

1. What is the basic structure of a C program?
2. Write a simple if statement to check if the number is positive.
3. How does the strcat() function work?
4. Define printf and scanf functions in C with an example.
5. How does exit function work in C?
6. How do you declare a string variable in C?

II. Answer any FIVE of the following : **(5×6= 30 Marks)**

7. Explain linear search with example.
8. What is a structure? How do you declare and access a structure variable?
9. Explain the difference between formatted and unformatted I/O functions in C with examples.
10. Write a C program to demonstrate else if ladder concept.
11. Explain array of structures with an example.
12. What is the difference between declaring and initializing a variable? Illustrate with examples.

III. Answer any FOUR of the following : **(4×10= 40 Marks)**

13. a) Describe different types of data types available in C with examples.
    b) Describe the significance of derived data types in C. Provide example for each.
14. Explain with examples different types of
    a) logical operators b) relational operators

15. Explain any two categories of functions in C with examples.

16. Explain with syntax and example
    a) One dimensional array b) Two dimensional array

17. Why are user-defined functions important in C programming? Discuss their role in structuring a program.

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21COAC103 Reg No : .....

CHOICE BASED CREDIT SYSTEM SEMESTER SCHEME

B.C.A. FIRST SEMESTER DEGREE EXAMINATION OCTOBER 2025

Mathematical Foundation

Duration:2 Hours **Max Marks:60**

PART - A

I. Answer any 6 questions. Each question carries 2 marks: **(2×6= 12 Marks)**

a. If $A = \begin{bmatrix} 2 & -3 & 1 \\ 4 & 2 & 3 \end{bmatrix}$ and $B = \begin{bmatrix} 3 & -2 & 4 \\ 1 & 3 & -5 \end{bmatrix}$, then show that $(A+B)^t = A^t + B^t$.

b. If $A = \begin{bmatrix} 2 & 1 & 3 \\ 2 & 3 & 1 \\ 1 & 1 & 2 \end{bmatrix}$ then find $\det A$.

c. Find the rank of the matrix: $A = \begin{bmatrix} 1 & 1 & 1 & -1 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 \end{bmatrix}$

d. Find the ratio in which the line joining the points $(3, 5)$ and $(-7, 9)$ is divided by the point $(\frac{1}{2}, 6)$

e. Find the slope of the line joining the points $A(1, -7)$ and $B(2, 3)$.

f. Find the equation of the circle , if the centre is $(0, 0)$ radius 6 units .

g. Convert $\frac{2\pi^c}{3}$ into degree .

h. Evaluate $\int (4x^3 + 3x^2 - 2x + 5)dx$

PART - B

2. Answer any 2 questions. Each question carries 6 marks: **(6×2= 12 Marks)**

a. Find the adjoint of the matrix $A = \begin{bmatrix} 2 & 3 & 1 \\ 1 & 2 & 3 \\ 3 & 1 & 2 \end{bmatrix}$.

b. Solve the system of equations by using Cramer's Rule :

$x + y + z = 9$

$2x + 5y + 7z = 52$

$2x + y - z = 0$

c. Solve the system of equations by using Matrix method :

$5x - 6y + 4z = 15$

$7x + 4y - 3z = 19$

$2x + y + 6z = 46$

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d. Let $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$, $B = \begin{bmatrix} 1 & 0 \\ 2 & -3 \end{bmatrix}$ and $C = \begin{bmatrix} 1 & -1 \\ 0 & 1 \end{bmatrix}$. Then show that

(i) $A(B+C) = AB + AC$.

(ii) $(AB)C = A(BC)$.

PART - C

3. Answer any 2 questions. Each question carries 6 marks: (6×2= 12 Marks)

a. Show that the matrix $A = \begin{bmatrix} 1 & 2 & 0 \\ 2 & -1 & 0 \\ 0 & 0 & -1 \end{bmatrix}$ satisfies its characteristic equations.

b. Reduce the matrix $A = \begin{bmatrix} 2 & 3 & -1 & -1 \\ 1 & -1 & -2 & -4 \\ 3 & 1 & 3 & -2 \\ 6 & 3 & 0 & -7 \end{bmatrix}$ to it's normal form and find the rank.

c. Compute the inverse of the matrix $A = \begin{bmatrix} 1 & 2 & 3 \\ 0 & 3 & 5 \\ 0 & 5 & 12 \end{bmatrix}$.

d. Find the characteristic equation of the matrix $A = \begin{bmatrix} 1 & -1 & 1 \\ 0 & 1 & 0 \\ 1 & -1 & 1 \end{bmatrix}$.

PART - D

4. Answer any 2 questions. Each question carries 6 marks: (6×2= 12 Marks)

a. Show that $A(4,1), B(7,4), C(13,-2)$ are the vertices of right angled triangle. Also find its area.

b. Find the area of the triangle formed by the points $(-2,4), (10,-2)$ and $(-3,0)$.

c. Find the equation of a line joining the points $(5,4)$ and $(2,7)$.

d. (i) Find the length of the perpendicular drawn from the point $(2,3)$ to the line $5x - y + 6 = 0$.

(ii) Find any one angle of the triangle, the equation of whose sides are $x + y + 5 = 0, x - y + 7 = 0$ and $y - 8 = 0$

PART - E

5. Answer any 2 questions. Each question carries 6 marks: (6×2= 12 Marks)

a. Simplify $\frac{\sin(2\pi - A)\cos(\pi + A)\tan(\frac{\pi}{2} - A)}{\sin(\frac{\pi}{2} - A)\cos(2\pi - A)\sin(\pi - A)}$

b. Verify $\sin 2A = 2\sin A \cos A = \frac{2\tan A}{1+\tan^2 A}$ where $A = 30°$.

c. Differentiate $(3x^2 + 5)(2x^3 + x + 7)$ with respect to x.

d. Find the maximum and minimum values of the function $2x^3 - 15x^2 + 36x + 12$.

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24COAC103 Reg No : .....

CHOICE BASED CREDIT SYSTEM

B.C.A FIRST SEMESTER DEGREE EXAMINATION OCTOBER 2025

COMPUTER APPLICATIONS

Mathematical Foundation

Duration:3 Hours **Max Marks:80**

I. Answer any EIGHT of the following : **(8×3= 24 Marks)**

a. If $A = \begin{bmatrix} 0 & 2 & 3 \\ 2 & 1 & 4 \end{bmatrix}$ and $B = \begin{bmatrix} 7 & 6 & 3 \\ 1 & 4 & 5 \end{bmatrix}$. Then find the value of $2A + 3B$.

b. If $A = \begin{bmatrix} 6 & 5 \\ 3 & 2 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & -1 \\ -1 & 1 \end{bmatrix}$ then find $|A|$ and $|B|$.

c. Find the rank of the matrix: $A = \begin{bmatrix} 1 & 2 & 3 & 1 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \end{bmatrix}$

d. Find the co-ordinates of the centroid of a triangle with vertices $(3, -2), (-1, -4)$ and $(-5, 6)$.

e. Find the value of k if the lines $2x - ky + 5 = 0$ and $5x + y = 0$ are perpendicular.

f. Find the equation of the circle, if the centre is $(1, -2)$ radius $\sqrt{3}$ units.

g. Express -720° in radians.

h. Evaluate $\int (4x^3 + 3x^2 - 2x + 5)dx$.

i. The following is the frequency distribution of the wages of workers of a factory. Find the arithmetic mean.

Daily Wages	80-100	100-120	120-140	140-160	160-180
No. of Workers	8	22	26	14	10

j. A fair die is thrown 100 times and its outcomes are recorded as shown below. Find the median outcome of the distributions.

Outcome	1	2	3	4	5	6
Frequency	17	15	16	18	16	18

II. Answer any EIGHT of the following : **(8×7= 56 Marks)**

a. If $A = \begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 2 & 2 & 1 \end{bmatrix}$. Show that $A^2 - 4A - 5I = 0$.

b. Solve the system of equations by using Matrix method :

$x + 2y + z = 4$

$x - y + z = 5$

$2x + 3y - z = 1$

c. Find the characteristic equation of the matrix $A = \begin{bmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}$

d. Reduce the matrix $A = \begin{bmatrix} 1 & 3 & 4 & 3 \\ 3 & 9 & 12 & 9 \\ -1 & -3 & -4 & -3 \end{bmatrix}$ to it's normal form and find the rank.

e. Show that the points $A(2, -1), B(3, 4), C(-2, 3)$ and $D(-3, -2)$ taken in order are the vertices of a square.

f. Find the area of the triangle formed by $A(1, -3), B(5, 2)$ and $C(3, 4)$. Hence find the length of the altitude from A.

g. Find the equation of the median through A of the triangle formed by the points $A(-5, 5)$, $B(-1, 7)$ and $C(3, -3)$.

h. If $\tan\theta = \frac{-3}{4}$, $\frac{\pi}{2} < \theta < \pi$, then find all the remaining trigonometric functions. Also find $\frac{5\cos\theta + 8\tan\theta}{8\sec\theta - cosec\,\theta}$.

i. Differentiate $(3x^2 + 5)(2x^3 + x + 7)$ with respect to x.

j. For the following distribution, find the quartiles.

$C.I$	$140-150$	$150-155$	$155-160$	$160-165$	$165-170$	$170-180$	$180-190$
f	1	4	12	23	30	25	10

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25COAAC101 Reg No : .....

CHOICE BASED CREDIT SYSTEM

B.C.A. FIRST SEMESTER DEGREE EXAMINATION OCTOBER 2025

COMPUTER APPLICATIONS (AI & ML)

Fundamentals of Computers and Programming in C

Duration:3 Hours Max Marks:80

I. Answer any FIVE of the following : (5×2= 10 Marks)

1. Write the syntax of pointer initialization.
2. What do you mean by number system?
3. What is Input and Output unit?
4. What is the significance of continue statement in C? Give an example.
5. What is function definition?
6. How do you read elements in a one dimensional array? Give an example.

II. Answer any FIVE of the following : (5×6= 30 Marks)

7. Explain different string handling functions in C.
8. Explain entry and exit controlled looping statements in C with an example.
9. Explain application software with any two examples.
10. Write a note on a) Arithmetic operators b) Relational operators
11. Explain with an example
    a) Backslash characters b) InputOutput functions.
12. What are constants? Explain any two types with an example.

III. Answer any FOUR of the following : (4×10= 40 Marks)

13. Explain any three decision making statements in C with syntax and example.
14. a) What is a flowchart? Explain any four symbols of flowchart.
    b) Explain any three benefits and limitations of flowchart.
15. Explain the following
    (i) nested structures (ii) array of structures
16. Explain the basic structure of C programming language with an example program.
17. a) What are the different formatting options for displaying integer numbers and real numbers in C?
    b) Explain the various ways to format integer and real numbers output in C.

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25COAAC102 Reg No : .....

CHOICE BASED CREDIT SYSTEM

B.C.A. FIRST SEMESTER DEGREE EXAMINATION OCTOBER 2025

COMPUTER APPLICATIONS (AI & ML)

Introduction to Artificial Intelligence

Duration:3 Hours **Max Marks:80**

I. Answer any FIVE of the following : **(5×2= 10 Marks)**

1. How many neurons are approximately present in the human brain?
2. What are the four main modules of an AI Agent's architecture?
3. How is AI used in finance?
4. What is the main difference between BFS and DFS?
5. Name the four main components of ontology.
6. Define First-Order Logic.

II. Answer any FIVE of the following : **(5×6= 30 Marks)**

7. Explain the key characteristics of a learning-based agent. How does it take decision in Artificial Intelligence?
8. List any four ethical issues of AI. Explain briefly.
9. What is Uniform Cost Search? Explain the key concepts of Uniform Cost Search (UCS) in Artificial Intelligence.
10. Define problem-solving in Artificial Intelligence. Explain the basic elements of a problem with examples.
11. What are the basic building blocks of a Semantic Network? Explain each one in detail.
12. Explain any four logical connectives with truth tables.

III. Answer any FOUR of the following : **(4×10= 40 Marks)**

13. How does a Model-Based Reflex Agent use internal state and percept history to make decisions? Explain with a neat diagram.
14. a) Define an AI environment and discuss its role in the functioning of AI agents.
    b) Describe the different types of AI environments with examples to illustrate each type.

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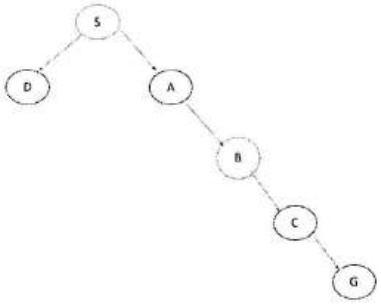
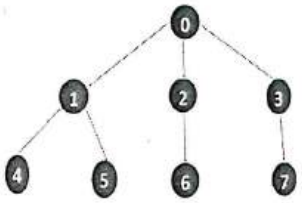
15. Perform a DFS traversal on the given graph and identify the path from S to G.



16. Perform a Breadth-First Search (BFS) starting from node 0 on the given graph. Show the step-by-step state of the visited and res arrays until all nodes are visited.



17. Explain the applications of Artificial Intelligence in GPS and Navigation, Healthcare, and Automobiles with suitable examples.

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25COAAC103 Reg No : .....

CHOICE BASED CREDIT SYSTEM

B.C.A. FIRST SEMESTER DEGREE EXAMINATION OCTOBER 2025

COMPUTER APPLICATIONS (AI & ML)

Mathematical Foundation

Duration:3 Hours **Max Marks:80**

I. Answer any EIGHT of the following : **(8×3= 24 Marks)**

a. If $A = \begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 2 & 2 & 1 \end{bmatrix}$. Find A^2

b. Show that $\begin{vmatrix} 1 & 2 \\ 3 & 4 \end{vmatrix} . \begin{vmatrix} 5 & 6 \\ 7 & 8 \end{vmatrix} = 4$

c. Find the characteristic equation of the matrix $A = \begin{bmatrix} 8 & 3 \\ 2 & -1 \end{bmatrix}$

d. Evaluate $\int_0^1 (2x^2 - x^3)dx$.

e. Let $X = \{1, 5, p, Jack\}, Y = \{2, 5, 7, q, Jill\}$ and $f = \{(1, 2), (5, 7), (p, q), (Jack, q)\}$. Find domain of f, range of f and $f(1)$.

f. If $\lceil x \rceil$ =the least integer greater than or equal to x . Find $\lceil -2.56 \rceil, \lceil 7.38 \rceil$.

g. A die is rolled once. Let X be the cube of the number appearing on the die. Find the range of the given random variable.

h. From a bag containing 10 red, 4 blue, and 6 black balls, a ball is drawn at random. What is the probability of drawing
   a) a blue ball
   b) a black ball
   c) not a blue ball

i. Describe the sample space for the indicated random experiment.
   a) A coin is tossed three times.
   b) A coin and die is tossed together.
   c) Two fair dice are rolled.

j. A fair coin is tossed three times. Let X be the number of heads appearing. Find the probability distribution of X. Also calculate the expected value of X.

II. Answer any EIGHT of the following : **(8×7= 56 Marks)**

a. Find the adjoint of the matrix $A = \begin{bmatrix} 1 & 1 & 1 \\ 1 & 2 & -3 \\ 2 & -1 & 3 \end{bmatrix}$

b. Compute the inverse of the matrix $A = \begin{bmatrix} 0 & 0 & 2 \\ 1 & 0 & 3 \\ -1 & 1 & 1 \end{bmatrix}$.

c. Show that the matrix $A = \begin{bmatrix} 1 & -1 & 1 \\ 0 & 1 & 0 \\ 1 & -1 & 1 \end{bmatrix}$ satisfies its characteristic equations .

d. Differentiate $\frac{x^2-1}{x^2+1}$ with respect to x .

e. Let $f : R \to R$ be given by $f(x) = 2x + 2$. Is f bijective.

f. Find $\lim_{x\to 0} \frac{\sqrt{1+x^2}-\sqrt{1-x^2}}{x}$.

g. A card is drawn from a well-shuffled deck of 52 cards.
   a) What is the probability that it is either a diamond or a 10?
   b) What is the probability that it is either an ace or a face card?

h. In a certain college, 25% of the students failed in Mathematics, 15% failed in Chemistry and 10% failed in both Mathematics and Chemistry. A student is selected at random:
   a) If the student failed in Chemistry, what is the probability that he or she failed in Mathematics?
   b) What is the probability that the student failed in Math or Chemistry?

i. In a certain college, 4 percent of the men and 1 percent of the woman are taller than 6 feet. Furthermore, 60 percent of the students are women. Suppose a randomly selected student is taller than 6 feet. Find the probability that the student is a woman?

j. Find the mean, variance and standard deviation of each distribution.

x	1	3	4	5
$f(x)$	0.4	0.1	0.2	0.3

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