



BCA/MAT : 101 (O)

2024

(1st Semester)

BACHELOR OF COMPUTER APPLICATIONS

Paper : MAT : 101 (Old Course)

(Mathematics-I)

Full Marks : 70

Pass Marks : 45%

Time : 3 hours

(PART : B—DESCRIPTIVE)

(Marks : 50)

*The figures in the margin indicate full marks
for the questions*

1. (a) Find A and B if $A+B = \begin{bmatrix} 7 & 0 \\ 2 & 5 \end{bmatrix}$ and

$$A-B = \begin{bmatrix} 3 & 0 \\ 8 & 3 \end{bmatrix}$$

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Or

Solve the following using Cramer's rule :

$$x - y - 2z = 3$$

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

$$4x - y - 2z = 11$$

(b) Prove that

$$\begin{vmatrix} 1 & a & a^2 \\ 1 & b & b^2 \\ 1 & c & c^2 \end{vmatrix} = (a-b)(b-c)(c-a)$$

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2. (a) The sum of 3 numbers in AP is 21 and their product is 280. Find the numbers.

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(b) If the 5th term of GP is 81 and 2nd term is 24, find the GP.

3

(c) Find the HP given that its 6th term is $\frac{1}{61}$ and 10th term is $\frac{1}{105}$.

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3. (a) If $y = x^4 + e^x$, then find $\frac{dy}{dx}$.

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(b) If $y = \frac{1+x^2}{1-x^2}$, then find $\frac{dy}{dx}$.

3

(c) If $z = \log(x^2 + y^2)$, then show that

$$\frac{\partial^2 z}{\partial x^2} + \frac{\partial^2 z}{\partial y^2} = 0$$

5

4. (a) Evaluate :

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$$\int \left(x + \frac{1}{x} \right)^2 dx$$

(b) Integrate by parts :

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$$\int x^3 e^{x^2} dx$$

Or

Integrate by substitution :

$$\int \frac{x}{4x^2 + 7} dx$$

(c) Evaluate :

4

$$\int \frac{3x-1}{(x-3)(x+1)} dx$$

5. (a) A group consists of 4 girls and 7 boys. In how many ways can a team of 5 members be selected if the team has—

- (i) no girls;
- (ii) at least one boy and one girl;
- (iii) at least 3 girls?

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- (b) A group of students consists of 5 boys and n girls. If the number of ways in which a team of three students can randomly be selected from this group such that there is at least one boy and at least one girl in each team is 1750, then find the value of n .

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(1st Semester)

BACHELOR OF COMPUTER APPLICATIONS

Paper : MAT : 101 (Old Course)

(Mathematics-I)

(PART : A—OBJECTIVE)

(Marks : 20)

The figures in the margin indicate full marks for the questions

1. Put a Tick (✓) mark against the correct answer in the brackets provided : 1×10=10

(a) The order of the matrix

$$A = \begin{bmatrix} 1 & 2 & 3 & 4 \end{bmatrix}$$

is

(i) 4×4 ()

(ii) 4×1 ()

(iii) 1×4 ()

(iv) None of the above ()

(b) If

$$\begin{bmatrix} 2 & 1 \\ -1 & 0 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 7 \\ 2 \end{bmatrix}$$

then the values of x and y are

(i) -2 and 11 ()

(ii) 12 and -11 ()

(iii) 2 and 11 ()

(iv) 3 and 11 ()

(c) ${}^nC_0$ is equal to

(i) 0 ()

(ii) 1 ()

(iii) n ()

(iv) $n!$ ()

(d) For two matrices A and B , matrix addition $A + B$ is possible if

(i) both matrices are of the same order ()

(ii) column of matrix A is equal to the row of matrix B ()

(iii) the row of matrix A is equal to the column of matrix B ()

(iv) None of the above ()

(e) The number of 4-letter words, with or without meaning, which can be formed out of the letters of the word 'ROSE', where the repetition of the letters is allowed, is

(i) 256 ()

(ii) 24 ()

(iii) 255 ()

(iv) 23 ()

(f) If ${}^nC_8 = {}^nC_2$, then the value of n is

(i) 8 ()

(ii) 9 ()

(iii) 10 ()

(iv) 2 ()

(g) If a is the first term and d is the common difference, then the n th term of the arithmetic progression is

(i) $a + nd$ ()

(ii) $\frac{1}{a + nd}$ ()

(iii) $a + (n - 1)d$ ()

(iv) $\frac{1}{a + (n - 1)d}$ ()

(h) If a , x , b are in geometric progression, then the geometric mean between a and b is

(i) $\sqrt{a}$ ()

(ii) $\sqrt{b}$ ()

(iii) $\sqrt{ab}$ ()

(iv) ab ()

(i) In arithmetic progression, the difference between any two consecutive terms is called

(i) common ratio ()

(ii) common difference ()

(iii) constant ratio ()

(iv) constant difference ()

(j) The value of $\frac{d}{dx}(x^3 + 2)$ is

(i) 2 ()

(ii) $2x^2$ ()

(iii) $3x^2$ ()

(iv) 3 ()

2. State whether the following statements are *True (T)* or *False (F)* by putting a Tick (✓) mark :

1×5=5

- (a) The value of the determinant is zero if two of its rows or columns are identical.

(T / F)

- (b) When the selection of objects is made disregarding the order of selection, it is called combination.

(T / F)

- (c) The determinant value of the matrix $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$ is one.

(T / F)

- (d) $\frac{d}{dx} \left[\frac{1}{x} \right] = -\frac{1}{x^2}$.

(T / F)

- (e) $\int_0^1 x^3 dx = \frac{1}{3}$.

(T / F)

3. Fill in the blanks with the appropriate answers from the choices given below : 1×5=5

$$\frac{1}{x}, 1, e^x, \sec^2 x, -\cos x, \cos x, e^{-x}, \frac{1}{x^2}$$

(a) $\frac{d}{dx}(\log x) = \underline{\hspace{2cm}}.$

(b) $\int e^x dx = \underline{\hspace{2cm}}.$

(c) $\frac{d}{dx}(\tan x) = \underline{\hspace{2cm}}.$

(d) $\int \sin x dx = \underline{\hspace{2cm}}.$

(e) $\frac{d}{dx}(-x)^{-1} = \underline{\hspace{2cm}}.$
