

Professional Course Examination (Odd), 2023

(1st Semester)

BACHELOR OF COMPUTER APPLICATIONS

Course No. : BCA/1/CC/02

(Basic Mathematics)

Full Marks : 75

Time : 3 hours

The figures in the margin indicate full marks for the questions

(PART : A—OBJECTIVE)

(Marks : 25)

SECTION—A

(Marks : 15)

A. Tick (✓) the correct answer in the brackets provided :

1×10=10

1. The HCF of 204, 1190 and 1445 is

- | | | | |
|--------|-------|--------|-------|
| (a) 17 | () | (b) 18 | () |
| (c) 19 | () | (d) 21 | () |

2. $\frac{3}{8}$ of $168 \times 15 \div 5 + ? = 549 \div 9 + 235$

- | | | | |
|---------|-------|---------|-------|
| (a) 107 | () | (b) 174 | () |
| (c) 1 | () | (d) 296 | () |

3. The average of first 50 natural numbers is

- | | | | |
|-----------|-------|-----------|-------|
| (a) 12.25 | () | (b) 21.25 | () |
| (c) 25 | () | (d) 25.5 | () |

4. If one-third of one-fourth of a number is 15, then three-tenth of that number is

- | | | | |
|--------|-------|--------|-------|
| (a) 35 | () | (b) 36 | () |
| (c) 45 | () | (d) 54 | () |

5. A and B can do a work in 12 days, B and C in 15 days and C and A in 20 days. If A, B and C work together, they will complete the work in
- (a) 5 days ()
- (b) $7\frac{5}{6}$ days ()
- (c) 10 days ()
- (d) $15\frac{2}{3}$ days ()
6. A boat running downstream covers a distance of 16 km in 2 hours while for covering the same distance upstream, it takes 4 hours. What is the speed of the boat in still water?
- (a) 4 km/hr () (b) 6 km/hr ()
- (c) 8 km/hr () (d) Data inadequate ()
7. The sum of 24 terms of the AP 1, 3, 5, 7,... is
- (a) 576 () (b) 672 ()
- (c) 584 () (d) 626 ()
8. The geometric mean between the numbers 5 and 125 is
- (a) 15 ()
- (b) 10 ()
- (c) 25 ()
- (d) 35 ()
9. A matrix having the same number of rows and columns is called
- (a) scalar matrix ()
- (b) square matrix ()
- (c) equal matrix ()
- (d) diagonal matrix ()
10. If any two rows or columns of a determinant are identical, then its value is
- (a) changed () (b) unchanged ()
- (c) one () (d) zero ()

B. State whether the following statements are *True (T)* or *False (F)* by putting a Tick (✓) mark : 1×5=5

1. $\sqrt{2} > \sqrt[3]{3}$.

(T / F)

2. Half of 1 percent written as a decimal is 0.005.

(T / F)

3. By selling an article for ₹ 100, a man gains ₹ 15. Then his gain % is $17\frac{1}{4}\%$.

(T / F)

4. A sequence in which each term except the first one differs from its preceding term by a constant is called geometric progression.

(T / F)

5. A square matrix A is said to be symmetric if $A' = A$.

(T / F)

SECTION—II

(Marks : 10)

C. Answer the following questions : 2×5=10

1. (a) Insert two fractions between $\frac{5}{9}$ and $\frac{1}{4}$.

OR

(b) Find the LCM of 24, 36 and 40.

2. (a) Two-fifth of one-third of three-seventh of a number is 15. What is 40 percent of that number?

OR

(b) Divide :

$$x^2 + 14x + 31 \div (x + 10)$$

3. (a) A train 150 m long is running with a speed of 68 kmph. In what time will it pass a man who is running at 8 kmph in the same direction in which the train is going?

OR

- (b) If the simple interest on a sum of money at 5% per annum for 3 years is ₹ 1200, find the compound interest on the sum for the same period at the same rate.
4. (a) Find the 10th and n th terms of the GP $12, 4, \frac{4}{3}, \frac{4}{9}, \dots$

OR

- (b) How many terms are there in the AP $10, 13, 16, \dots, 43$?
5. (a) If

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

show that $A^2 = A$.

OR

- (b) If

$$A = \begin{bmatrix} 3 & 5 \\ -2 & 0 \\ 4 & -6 \end{bmatrix}$$

verify that $(2A)' = 2A'$.

(PART : B—DESCRIPTIVE)

(Marks : 50)

1. (a) Simplify :

$$\left[3\frac{1}{4} + \left\{ 1\frac{1}{4} - \frac{1}{2} \left(2\frac{1}{2} - \frac{1}{4} - \frac{1}{6} \right) \right\} \right]$$

(b) If

$$x = \left(\frac{\sqrt{5} + \sqrt{3}}{\sqrt{5} - \sqrt{3}} \right) \text{ and } y = \left(\frac{\sqrt{5} - \sqrt{3}}{\sqrt{5} + \sqrt{3}} \right)$$

find the value of $x^2 + y^2$.

3

(c) $(18)^{3.5} \div (27)^{3.5} \times 6^{3.5} = 2x$, find the value of x .

4

OR

2. (a) Reduce $\frac{128352}{238368}$ to its lowest terms.

3

(b) Four children A, B, C and D divide a bag of sweets. A takes $\frac{1}{3}$ of them, B takes $\frac{2}{5}$ th of the remainder and the rest is equally shared between C and D. What fraction of the sweets did C or D get?

3

(c) Find $\sqrt{64009}$ and $\sqrt[3]{0.000064}$.

4

3. (a) Find the value of k for which the system of equations

$$3x + y = 1, (2k - 1)x + (k - 1)y = (2k + 1)$$

has no solution.

5

(b) Solve for x and y : $10x + 3y = 75$, $6x - 5y = 11$.

3

(c) If 35% of a number is 175, then what percent of 175 is that number?

2

OR

4. (a) Solve : $4x^3 - 2x^2 - 36x + 18 = 0$.

4

(b) A fraction becomes $\frac{2}{3}$ when 1 is added to both its numerator and denominator. And it becomes $\frac{1}{2}$ when 1 is subtracted from both the numerators and denominators. Find the fraction.

3

(c) In a mixture of 60 litres, the ratio of milk and water is 2 : 1. If this ratio is to be 1 : 2, then find the quantity of water to be further added.

3

5. (a) A shopkeeper sells one transistor for ₹ 840 at a gain of 20% and another for ₹ 960 at a loss of 4%. Find his total gain or loss percent.
- (b) A started a business investing ₹ 45,000. After 3 months, B joined him with a capital of ₹ 60,000. After another 6 months, C joined them with a capital of ₹ 90,000. At the end of the year, they made a profit of ₹ 16,500. Find the share of each.
- (c) While covering a distance of 24 km, a man noticed that after walking for 1 hour and 40 minutes, the distance covered by him was $\frac{5}{7}$ of the remaining distance. What was his speed in metres per second?

OR

6. (a) Study the following table carefully and answer these questions :
Number of candidates appeared and qualified in a competitive examination from different States over the years :

| Year/ State | 1997 | | 1998 | | 1999 | | 2000 | | 2001 | |
|----------------|------|-------|------|-------|------|-------|------|-------|------|-------|
| | App. | Qual. | App. | Qual. | App. | Qual. | App. | Qual. | App. | Qual. |
| M | 5200 | 720 | 8500 | 980 | 7400 | 850 | 6800 | 775 | 9500 | 1125 |
| N | 7500 | 840 | 9200 | 1050 | 8450 | 920 | 9200 | 980 | 8800 | 1020 |
| P | 6400 | 780 | 8800 | 1020 | 7800 | 890 | 8750 | 1010 | 9750 | 1250 |
| Q | 8100 | 950 | 9500 | 1240 | 8700 | 980 | 9700 | 1200 | 8950 | 995 |
| R | 7800 | 870 | 7600 | 940 | 9800 | 1350 | 7600 | 945 | 7990 | 885 |

- (i) Combining the States P and Q together in 1998, what is the percentage of the candidates qualified to that of the candidates appeared? 1
- (ii) Find the percentage of the total number of qualified candidates to the total number of appeared candidates among all the five States in 1999. 1
- (iii) What is the percentage of candidates qualified from State N for all the years together, over the candidates appeared from State N during all the years together? 1
- (iv) What is the average of candidates who appeared from State Q during the given years? 1

(v) In which of the given years the number of candidates appeared from State P has maximum percentage of qualified candidates? 5

(vi) Total number of candidates qualified from all the States together in 1997 is approximately, what percentage of the total number of candidates qualified from all the States together in 1998? 1

7. (a) The sum of three numbers in GP is $\frac{39}{10}$ and their product is 1. Find the numbers. 4

(b) Find the sum of the series $8 + 88 + 888 + \dots$ to n terms. 3

(c) The 5th and 13th terms of AP are 5 and -3 respectively. Find this AP and obtain its 16th term. 3

OR

8. (a) Insert three numbers between $\frac{1}{3}$ and 432 so that the resulting sequence is a GP. 3

(b) Find the sum of 20 terms of the AP $\sqrt{2}, 2\sqrt{2}, 3\sqrt{2}, \dots$. 3

(c) If a, b, c are in AP, show that

$$(b + c - a), (c + a - b), (a + b - c)$$

are in AP. 4

9. (a) Find the inverse of the matrix given below : 5

$$\begin{bmatrix} 2 & -1 & 1 \\ 3 & 0 & -1 \\ 2 & 6 & 0 \end{bmatrix}$$

(b) Using properties of determinants, prove that

$$\begin{vmatrix} x & x^2 & yz \\ y & y^2 & zx \\ z & z^2 & xy \end{vmatrix} = (x - y)(y - z)(z - x)(xy + yz + zx)$$

3

(c) Find the matrix X such that $2A - B + X = 0$ where

$$A = \begin{bmatrix} 3 & 1 \\ 0 & 2 \end{bmatrix} \text{ and } B = \begin{bmatrix} -2 & 1 \\ 0 & 3 \end{bmatrix}$$

2

OR

10. (a) Solve the following system of equations using matrix method :

6

$$x + y + z = 6$$

$$x + 2z = 7$$

$$3x + y + z = 12$$

(b) If

$$\begin{bmatrix} 1 & x & 1 \end{bmatrix} \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 3 & 2 & 5 \end{bmatrix} \begin{bmatrix} 1 \\ -2 \\ 3 \end{bmatrix} = 0$$

find x .

4
