

Professional Course (Odd) Examination, 2022

(1st Semester)

BACHELOR OF COMPUTER APPLICATIONS

Course No. : BCA/1/CC/02

(Basic Mathematics)

(Revised)

Full Marks : 75

Time : 3 hours

(PART : A—OBJECTIVE)

(Marks : 25)

The figures in the margin indicate full marks for the questions

SECTION—A

(Marks : 15)

Choose and write the correct answer : $1 \times 10 = 10$

1. The square root of 64009 is

(a) 253

(b) 347

(c) 363

(d) 803

2. If $\frac{a}{b}$ and $\frac{c}{d}$ are two given fractions and $\frac{c}{d} < \frac{a}{b}$, then

(a) $\frac{a}{b} < \frac{(a+c)}{(b+c)} < \frac{c}{d}$

(b) $\frac{a}{b} > \frac{(a+c)}{(b+c)} > \frac{c}{d}$

(c) $\frac{c}{d} < \frac{(a+c)}{(b+c)} < \frac{a}{b}$

(d) None of the above

3. A polynomial of degree 4 is called

(a) biquadratic

(b) trinomial

(c) monomial

(d) linear

4. $\frac{1}{2}$ is what percent of $\frac{1}{3}$?

(a) 90%

(b) 150%

(c) 120%

(d) 100%

5. A sells an article which costs him ₹ 400 to B at a profit of 20%. B then sells it to C, making a profit of 10% on the price he paid to A. How much does C pay to B?

(a) ₹ 472

(b) ₹ 528

(c) ₹ 532

(d) ₹ 476

6. How long will a boy take to run round a square field of side 35 metres, if he runs at the rate of 9 km/hr?

(a) 50 sec

(b) 52 sec

(c) 54 sec

(d) 56 sec

7. How many terms are there in the AP 7, 13, 19, ..., 205?

(a) 24

(b) 42

(c) 34

(d) 52

8. The AM between $(a - b)$ and $(a + b)$ is

- (a) a
- (b) b
- (c) $2a$
- (d) $2b$

9. If any two rows or columns of a determinant are identical, then its value is

- (a) changed
- (b) zero
- (c) one
- (d) unchanged

10. A given system of equations which has one or more solutions is said to be

- (a) inconsistent
- (b) skew-symmetric
- (c) symmetric
- (d) consistent

Write True or false :

$1 \times 5 = 5$

11. A number which can neither be expressed as a terminating decimal nor a repeating term is called rational number.

12. The equality of two ratios is called proportion.

13. A clock is started at noon, by 10 minutes past 5, the hour has turned through 155° .

14. Sequence following certain patterns are called series.

15. A square matrix in which every non-diagonal element is zero and all diagonal elements are equal is known as null matrix.

SECTION—B

(Marks : 10)

Answer the following questions :

2×5=10

1. (a) Evaluate : $\sqrt{248 + \sqrt{51 + \sqrt{169}}}$.

OR

(b) Simplify : $18 - [5 - \{6 + 2(7 - \overline{8 - 5})\}]$.

2. (a) Factorize : $3x^2 - 14x + 8$.

OR

(b) What is the sum of two consecutive even numbers, the difference of whose squares is 84?

3. (a) Find the simple interest on ₹ 68,000 at $6\frac{2}{3}\%$ per annum for 9 months.

OR

(b) Find the ratio in which rice at ₹ 7.20 a kg mixed with rice at ₹ 5.70 a kg to produce a mixture worth ₹ 6.30 a kg.

4. (a) Find the sum of 23 terms of the AP 5, 9, 13, 17, ...

OR

(b) Find the harmonic mean of 1, 2, 4 and 10.

5. (a) Find the matrix A such that

$$\begin{bmatrix} 5 & -7 \\ -2 & 3 \end{bmatrix} \cdot A = \begin{bmatrix} -16 & -6 \\ 7 & 2 \end{bmatrix}$$

OR

(b) Find the value of x and y when

$$\begin{bmatrix} 2x+5 & 7 \\ 0 & 3y-7 \end{bmatrix} = \begin{bmatrix} x-3 & 7 \\ 0 & -5 \end{bmatrix}$$

(PART : B—DESCRIPTIVE)

(Marks : 50)

The figures in the margin indicate full marks for the questions

1. (a) If $(18)^{3.5} + (27)^{3.5} \times 6^{3.5} = 2^x$, find the value of x . 3
(b) Find the square root of 1471369. 3
(c) Find the HCF of 2923 and 3239. Also find the LCM of $\frac{2}{3}, \frac{3}{5}, \frac{4}{7}, \frac{9}{13}$. 4
- OR
- (d) Arrange the fractions $\frac{17}{18}, \frac{31}{36}, \frac{43}{45}, \frac{59}{60}$ in the ascending order. 3
(e) If $\frac{9^n \times 3^5 \times (27)^3}{3 \times (81)^4} = 27$, find the value of n . 3
(f) If $\frac{5}{6} + \frac{6}{7} \times x - \frac{8}{9} + 1\frac{3}{5} + \frac{3}{4} \times 3\frac{1}{3} = 2\frac{7}{9}$, find the value of x . 4
2. (a) Show that the system of equations $2x + 5y = 17, 5x + 3y = 14$ has a unique solution. Find the solution. 5
(b) Solve : $\frac{2x}{(x-4)} + \frac{(2x-5)}{(x-3)} = \frac{25}{3}$ 5
- OR
- (c) Divide $(x^3 + 10x^2 + 13x + 36) \div (x + 9)$. 4
(d) If the mean of a, b, c is M and $ab + bc + ca = 0$, find the mean of a^2, b^2, c^2 . 3
(e) If $45\% \text{ of } 1500 + 35\% \text{ of } 1700 = x\% \text{ of } 3175$, find the value of x . 3
3. (a) A sum of money lent at compound interest for 2 years at 20% per annum would fetch ₹ 482 more, if the interest was payable half-yearly, than if it was payable annually. Find the sum. 3

3

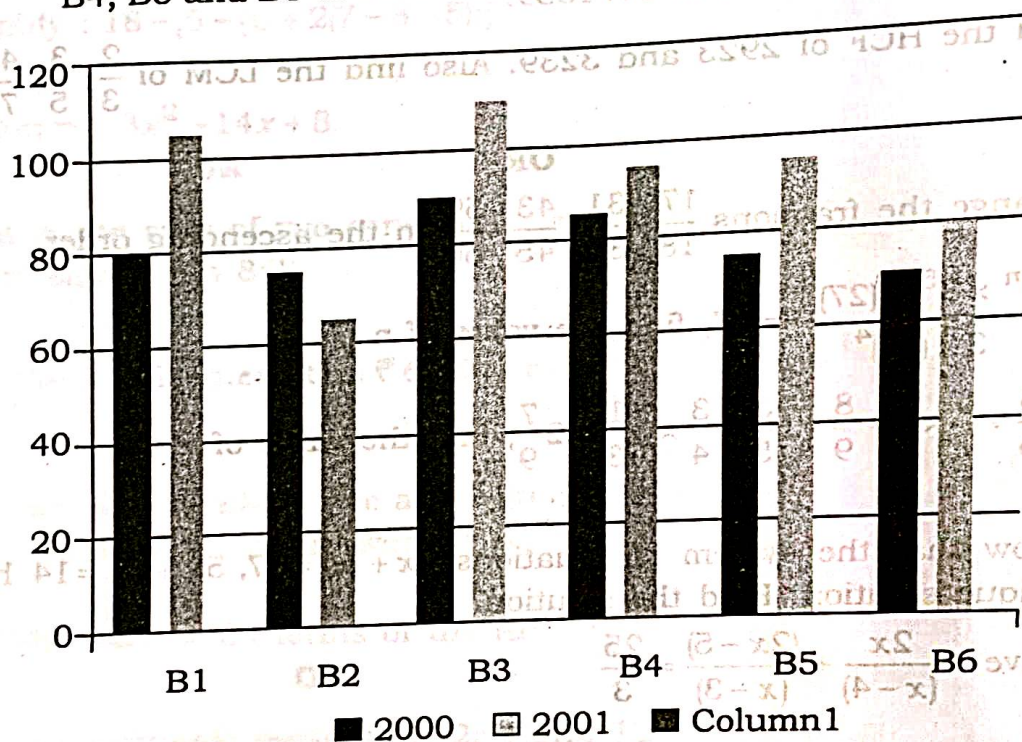
(b) What was the day of the week on 28th May, 2006?

(c) A train travelling at 48 kmph completely crosses another train having half its length and travelling in opposite direction at 42 kmph, in 12 seconds. It also passes a railway platform in 45 seconds. Find the length of the platform.

4

OR

(d) Sales of Books (in thousand numbers) from Six Branches B1, B2, B3, B4, B5 and B6 of a Publishing Company in 2000 and 2001



(i) Find the total sales of branches B1, B3 and B5 together for both the years.

(ii) Total sales of branch B6 for both the years is what percent of the total sales of branch B3 for both the years?

(iii) What is the average sale of all the branches (in thousand numbers) for the year 2000?

(iv) What is the ratio of the total sales of branch B2 for both years to the total sales of branch B4 for both years?

(v) What percent of the average sales of branches B1, B2 and B3 in 2001 is the average sales of branches B1, B3 and B6 in 2000? 2

(e) A and B can do a piece of work in 30 days, while B and C can do the same work in 24 days, and C and A in 20 days. They all work together for 10 days when B and C leave. How many days more will A take to finish the work? 4

4. (a) If a, b, c, d are in GP, prove that

$$(a^2 + b^2 + c^2)(b^2 + c^2 + d^2) = (ab + bc + cd)^2 \quad 4$$

(b) Find the sum of the series $5 + 55 + 555 + \dots$ to n terms. 3

(c) Insert three numbers between 3 and 19 such that the resulting sequence is an AP. 3

OR

(d) How many terms of the AP 26, 21, 16, 11, ... are needed to give the sum 11? 3

(e) If a, b, c are in AP, show that $(bc - a^2)(ca - b^2)(ab - c^2)$ are in AP. 4

(f) Compute the 16th term of HP if the 6th and 11th terms of HP are 10 and 18 respectively. 3

5. (a) Solve the following system of equations using matrix method : 6

$$x + y - z = 1$$

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

$$x - y - z = -1$$

(b) Using properties of determinants, prove that

$$\begin{vmatrix} b^2 + c^2 & a^2 & a^2 \\ b^2 & c^2 + a^2 & b^2 \\ c^2 & c^2 & a^2 + b^2 \end{vmatrix} = 4a^2b^2c^2 \quad 4$$

OR

(c) Using elementary row transformation, find the inverse of the following matrix :

$$\begin{bmatrix} 2 & 5 \\ -3 & 1 \end{bmatrix}$$

(d) Express the matrix $A = \begin{bmatrix} 3 & -4 \\ 1 & -1 \end{bmatrix}$, as the sum of a symmetric matrix and a skew-symmetric matrix.

(e) If $A = \begin{bmatrix} 1 & 0 \\ -1 & 7 \end{bmatrix}$, find k so that $A^2 = 8A + kI$.

OR

(a) How many terms of the AP 26, 21, 16, 11, ... are needed to give the sum 119?

(b) If a, b, c are in AP, show that $(b-a)^2 + (c-a)^2 + (c-b)^2 = 3(a^2 + b^2 + c^2) - 6abc$.

(c) Compute the 10th term of the AP if the 5th and 11th terms of AP are 10 and 18 respectively.

(d) Solve the following system of equations using matrix method :

$$3x + y - 12 = 0$$

(e) Using properties of determinants, prove that