

**Professional Course Examination, Odd 2021**  
**(First Semester)**  
**BACHELOR OF COMPUTER APPLICATIONS**  
**Basic Mathematics (Revised)**  
*Full Marks: 75*  
*Time: 3 Hours*

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

**(PART : A – OBJECTIVE)**  
**(Marks : 25)**

**SECTION – I**  
**(Marks : 15)**

1. Choose the correct answer:

**(1x10=10)**

- a) The product of a rational and an irrational number is
- i) always an integer
  - ii) always a rational number
  - iii) always an irrational number
  - iv) sometimes rational and sometimes irrational
- b)  $(17)^{3.5} \times (17)^7 = 17^8$
- i) 2.29
  - ii) 27.5
  - iii) 4.25
  - iv) 4.5
- c) The number which when multiplied by 15 is increased by 196 is
- i) 10
  - ii) 14
  - iii) 12
  - iv) 16
- d) What is the number whose 20% is 30% of 40?
- i) 90
  - ii) 80
  - iii) 60
  - iv) 50
- e) The length of two trains is 5 : 3 and the ratio of their speeds is 6:5. The ratio of time taken by them to cross a pole is
- i) 5:6
  - ii) 11:8
  - iii) 25:18
  - iv) 27:16

- f) In what ratio must water be mixed with milk costing Rs 18 per litre to obtain a mixture worth of Rs 6 per litre?
- 1:2
  - 2:1
  - 3:4
  - 2:5
- g) The sum of 8 terms of the GP 3, 6, 12, 24..... is
- 525
  - 675
  - 575
  - 765
- h) The Harmonic mean of 5, 10 and 15 is
- 8.33
  - 10
  - 9.23
  - 6
- i) A is an  $(m \times n)$  matrix and B is an  $(n \times p)$  matrix, if AB exists then it is an
- $(m \times n)$  matrix
  - $(m \times p)$  matrix
  - $(n \times n)$  matrix
  - $(n \times p)$  matrix
- j) If A is a square matrix, then  $A - A'$  is a
- Diagonal matrix
  - skew symmetric matrix
  - Symmetric matrix
  - none of these

2. Indicate whether the following statements are True (T) or False (F):

(1x5=5)

- All irrational numbers form the set of all real numbers.
- A polynomial contains any number of terms.
- The simple interest at  $x\%$  for  $x$  years will be Rs  $x$  on a sum of Rs  $\left(\frac{100}{x}\right)$
- Sequence following certain patterns are called series.
- If A is a square matrix and I is an identity matrix of same order as A, then  $A \cdot I = 0$

## SECTION – II

(Marks : 10)

3. Answer the following questions:

(2x5=10)

- a) i) Two numbers are in the ratio of 15 : 11. If their HCF is 13, find the numbers.

OR

- ii) Find the largest from among  $\sqrt[4]{6}$ ,  $\sqrt{2}$  and  $\sqrt[3]{4}$

b) i) Solve  $6x^2 - 19x - 7 = 0$

OR

ii) If  $a : b = 2 : 3$ ,  $b : c = 4 : 5$  and  $c : d = 6 : 7$ , find  $a : d$  ?

c) i) A train moves past a pole and a bridge 264m long in 8 seconds and 20 seconds respectively. What is the speed of the train?

OR

ii) A and B are partners in a business. A invests Rs 35000 for 8 months and B invests Rs 42000 for 10 months. Out of a profit of Rs 31570, find A's share.

d) i) Find the 23<sup>rd</sup> term of the AP 7, 5, 3, 1, .....

OR

ii) Find A.M between 3.7 and 5.5

e) i) Find the value of  $x$  and  $y$ , when  $\begin{bmatrix} 2 & -3 \\ 1 & 1 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 1 \\ 3 \end{bmatrix}$

OR

ii) If  $A = \begin{bmatrix} 2 & -3 & 5 \\ 0 & 7 & -4 \end{bmatrix}$ , verify that  $(A')' = A$

**(PART : B – DESCRIPTIVE)**

**(Marks : 50)**

4. a) i) Simplify  $\frac{1}{1 + \frac{\frac{2}{3}}{1 + \frac{\frac{8}{9}}{1 + \frac{\frac{2}{3}}{1 - \frac{2}{3}}}}}$  (3)

ii) Insert three fractions between  $4/7$  and  $3/4$  (3)

iii) Find the HCF and LCM of 510 and 92. (4)

OR

b) i) Find the square root of 180625. (3)

ii) Find the value of  $\frac{(243)^{0.13} \times (243)^{0.07}}{(7)^{0.25} \times (49)^{0.075} \times (343)^{0.2}}$  (3)

iii)  $\frac{3}{4} \div 2\frac{1}{4}$  of  $\frac{2}{3} - \frac{\frac{1}{2} - \frac{1}{3}}{\frac{1}{2} + \frac{1}{3}} \times 3\frac{1}{3} + \frac{5}{6} = x$ , find  $x$  (4)

5. a) i) Evaluate  $(x^3 + 10x^2 + 13x + 36) \div (x + 9)$  (4)

ii) Show that the following system of linear equations has a unique solution :  $3x + 5y = 12$ ,  $5x + 3y = 4$ . Also find the solution of the given system of equations. (6)

OR

b) i) Solve the following quadratic equations:  $\frac{x-1}{x-2} + \frac{x-3}{x-4} = 3\frac{1}{3}$  (4)

ii) Find the average of the two digit numbers, which remain the same when the digits interchange their positions. (3)

iii) If 35% of a number is 175, then what percent of 175 is that number? (3)

6. a) i) A man sells an article at a profit of 25%. If he had bought it at 20% less and sold it for Rs 10.50 less, he would have gained 30%. Find the cost price of the article. (4)

ii) What is the difference between the compound interest on Rs 5000 for  $1\frac{1}{2}$  years at 4% per annum compounded yearly and half yearly? (3)

iii) Two pipes A and B together can fill a cistern in 4 hours. Had they been opened separately, then B would have taken 6 hours more than A to fill the cistern. How much time will be taken by A to fill the cistern separately. (3)

OR

b) i) A and B can do a piece of work in 5 days, B and C can do it in 7 days, A and C can do it in 4 days. Who among these will take the least time if put to do it alone? (3)

ii) A man rows to a place 48 km distant and come back in 14 hours. He finds that he can row 4 km against the stream. Find the force of stream. (3)

iii) A and B started a partnership business investing Rs 20,000 and Rs 15,000 respectively. C joined them with Rs 20,000 after six months. Calculate A's and B's share in total profit of Rs 25,000 earned at the end of 2 years from the starting of the business. (4)

7. a) i) Insert four numbers between 4 and 29 such that the resulting sequence is an AP. (3)

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

iii)  $a, b, c, d$  are in GP, prove that  $(b - c)^2 + (c - a)^2 + (d - b)^2 = (a - d)^2$  (4)

OR

b) i) If the sum of reciprocals of first 11 terms of HP series is 110, find the 6<sup>th</sup> term. (3)

ii) For any two positive numbers  $a$  and  $b$ , show that  $(AM) \geq (GM)$ . (3)

iii) The sum of three numbers in GP is 21 and the sum of their squares is 189. Find the numbers. (4)

8. a) i) Using elementary row transformations, find the inverse of the following matrix  $\begin{bmatrix} 2 & -3 \\ 4 & 5 \end{bmatrix}$  (3)

ii) 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)

iii) If  $A = \begin{bmatrix} -1 & -2 & -2 \\ 2 & 1 & -2 \\ 2 & -2 & 1 \end{bmatrix}$ , show that  $\text{adj } A = 3A$  (4)

OR

b) i) If  $A = \begin{bmatrix} 2 & -3 & 5 \\ 3 & 2 & -4 \\ 1 & 1 & -2 \end{bmatrix}$ , find  $A^{-1}$ . Using  $A^{-1}$ , solve the following system of equations:

$$2x - 3y + 5z = 11$$

$$3x + 2y - 4z = -5$$

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

(6)

ii) Express the matrix  $A = \begin{bmatrix} 2 & 3 \\ -1 & 4 \end{bmatrix}$  as the sum of a symmetric matrix and a skew symmetric matrix. (4)