ST. JOSEPH'S COLLEGE (AUTONOMOUS), BENGALURU-27
B.Sc., MATHEMATICS - I SEMESTER
SEMESTER EXAMINATION: OCTOBER 2021
(Examination conducted in January-March 2022)

MTOE2 - BUSINESS MATHEMATICS

Time- 2 hrs   Max Marks-60

This question paper contains 2 printed pages and four parts

I. Answer any 10 FULL questions   (10 x 2 = 20)

1. For what value of k, the system of equations $kx - 20y - 6 = 0$ and $6x - 10y - 14 = 0$ has no solution?

2. The cost of two sarees and four shirts is Rs.16,000, while one saree and six shirts cost the same. Find the cost of twelve shirts?

3. If $x^2 - 3x + 1 = 0$, Find the value of $x + \frac{1}{x}$.

4. Find the roots of the equation $2^{2x^2 - 7x + 7} = 4$.

5. If $A = \begin{bmatrix} 1 & -2 & 3 \\ -4 & 2 & 5 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & 3 \\ 4 & 5 \\ 2 & 1 \end{bmatrix}$, then find AB, BA.

6. Evaluate $\begin{vmatrix} x & x+1 \\ x-1 & x \end{vmatrix}$.

7. Find the values of a, b, c and d from the equation $\begin{bmatrix} 2a+b & a-2b \\ 5c-d & 4c+3d \end{bmatrix} = \begin{bmatrix} 4 & -3 \\ 11 & 24 \end{bmatrix}$.

8. Solve the system of Equations $2x + 5y = 1, 3x + 2y = 7$.

9. Define   i) Duplicate ratio   ii) Sub-Duplicate ratio

10. State the following properties of Proportion i) Componendo property ii) Subtrahendo property

11. The price of computer is Rs. 20000. what is the price of it after reduction of 25%?

12. State whether the given statements are true or false:

    (i) 12 : 18 = 28 : 56   (ii) 25 persons : 130 persons = 15kg : 78kg

II. Answer any TWO FULL questions   (2 x 5 = 10)

13. If $\left(a + \frac{1}{a} \right)^3 = 3$, what is the value of $a^3 + \frac{1}{a^3}$?

14. Find the two consecutive odd positive integers, whose sum of squares is 290.

15. One says "Give me a hundred friend! I shall then become twice as rich as you". The other replies, "If you give me ten. I shall become six times as rich as you". Find the amount of their capital?

III. Answer any THREE FULL questions   (3 x 5 = 15)

16. Solve the following system of equations by matrix method.

    $3x - 2y + 3z = 8$
    $2x + y - z = 1$
    $4x - 3y + 2z = 4$

17. Obtain the inverse of the following matrix using elementary operations $\begin{bmatrix} 0 & 1 & 2 \\ 1 & 2 & 3 \\ 3 & 1 & 1 \end{bmatrix}$.

18. Express the matrix $B = \begin{bmatrix} 2 & -2 & -4 \\ -1 & 3 & 4 \\ 1 & -2 & -3 \end{bmatrix}$ as the sum of a Symmetric and a Skew Symmetric matrix.

19. If $A = \begin{bmatrix} -2 \\ 4 \\ 5 \end{bmatrix}$ and $B = [1 \quad 3 \quad -6]$, verify that $(AB)' = B'.A'$

20. Find minors of $a_{11}.a_{22}, a_{33}$ and cofactors of a_{21}, a_{31} the elements of the determinant $\begin{bmatrix} 2 & -3 & 5 \\ 6 & 0 & 4 \\ 1 & 5 & -7 \end{bmatrix}$.

IV. Answer any THREE FULL questions   (3 x 5 = 15)

21. i) Rahul bought a sweater and saved Rs 20 when a discount of 25% was given.

  What was the price of the sweater before the discount?

  ii). Ratio of incomes of Ram and Ravi is 4 : 3 and expenditure ratio is 3 : 2.

  If each person saves Rs. 2500, find their income.   (1+4)

22. i) A map is given with a scale of 2 cm = 1000 km. What is the actual distance between the two places in kms, if the distance in the map is 2.5 cm?

  ii) The car that I own can go 150 km with 25 litres of petrol. How far can it go with 30 litres of petrol?   (3+2)

23. The cost of 5 metres of a particular quality of cloth is Rs. 210.

  Tabulate the cost of 2, 4, 10 and 13 metres of cloth of the same type.

24. i) If Rs 250 is to be divided amongst Ravi, Raju and Roy, so that Ravi gets two parts, Raju three parts and Roy five parts. How much money will each get?

  ii) The number of illiterate persons in a country decreased from 150 lakhs to 100 lakhs in 10 years. What is the percentage of decrease?   (3+2)

25. If a : 3 = b : 4 = c : 7, then, find the value of $(a + b + c) : c$