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| <b>Name:</b>         |  |
| <b>Enrolment No:</b> |  |

**UPES**

**End Semester Examination, December 2024**

**Course: Business Mathematics**

**Program: BBA All/ B. Com/ Int. BBA-MBA/Int.B.Com-MBA**

**Course Code: DSQT1001**

**Semester : I**

**Time : 03 hrs.**

**Max. Marks: 100**

**Instructions: Attempt all questions.**

**SECTION A**  
**10Qx2M=20Marks**

| S. No. |  | Marks    | CO         |
|--------|--|----------|------------|
| Q 1    | <b>Multiple Choice Questions.</b>  |          | <b>CO1</b> |
| i.     | If $P = \{4, 5, 6, 7, 8\}$ and $Q = \{9, 10\}$ are two definite sets then which of the following statements is not correct:<br>a) P and Q are disjoint sets.<br>b) Union of P and Q is an infinite set.<br>c) Intersection of sets P and Q is a void set.<br>d) All of the above | <b>2</b> | <b>CO1</b> |
| ii.    | Given that A and B are invertible matrices, which of the following is true about the matrix $(AB)^{-1}$ ?<br>a) $(AB)^{-1} = A^{-1}B^{-1}$<br>b) $(AB)^{-1} = B^{-1}A^{-1}$<br>c) $(AB)^{-1} = A^{-1} \times (B^{-1})^T$<br>d) $(AB)^{-1} = B^T A^{-1}$                          | <b>2</b> | <b>CO1</b> |
| iii.   | The sum of the first 10 terms of an Arithmetic Progression is 150, and the common difference is 5. What is the first term?<br>a) 5<br>b) 10<br>c) 15<br>d) 20  | <b>2</b> | <b>CO1</b> |
| iv.    | $\int \frac{dx}{\sqrt{x}} =$<br><br>(a) $\sqrt{x} + c$<br>(b) $2\sqrt{x} + c$<br>(c) $x + c$<br>(d) $23x^{3/2} + c$  | <b>2</b> | <b>CO1</b> |

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| v.   | The first order differentiation of any function at any point gives the<br>a) rate of change in the function at the point<br>b) rate of change in the slope of the function<br>c) both (a) and (b) are correct<br>d) none are correct | 2 | CO1 |
| vi.  | If $\begin{bmatrix} 9-x & 2 \\ 8 & 6 \end{bmatrix} = \begin{bmatrix} 5 & 2 \\ 8 & 6 \end{bmatrix}$ then x =<br><br>(a) $\pm 6$<br>(b) 6<br>(c) 4<br>(d) 5  | 2 | CO1 |
| vii.                                       | The value of $\int (6x^2 + 4)dx$ is<br><br>a) $2x^3 + x + C$<br>b) $6x^3 + 4x + C$<br>c) $2x^3 + 4x + C$<br>d) $6x^3 + 4 + C$  | 2 | CO1 |
| viii.                                      | Which of the following two sets are equal?<br>a) $A = \{1, 2\}$ and $B = \{1\}$<br>b) $A = \{1, 2\}$ and $B = \{1, 2, 3\}$<br>c) $A = \{1, 2, 3, 4\}$ and $B = \{2, 1, 3, 4\}$<br>d) $A = \{1, 2, 4\}$ and $B = \{1, 2, 3\}$         | 2 | CO1 |
| ix.  | Find the 8th term of the series 4, -8, 16, -32.....<br>a) 512<br>b) -512<br>c) 521<br>d) -521  | 2 | CO1 |
| x.   | A is a square matrix and all the elements of one column are zero then determinant of matrix A is<br>a) Infinite<br>b) Can't be determined<br>c) Insufficient information<br>d) Zero  | 2 | CO1 |
| <b>SECTION B</b><br><b>4Qx5M= 20 Marks</b> |  |   |     |
| Q 2.                                       |  |   |     |
| i.   | In a survey of 500 students, it was found that 300 had taken mathematics, 200 had taken physics, and 100 had taken mathematics & physics. Find the number of students that had i) only mathematics iii) only physics                 | 5 | CO2 |
| ii.  | Differentiate of the following:<br>(a) $F(x) = (1+x^3+x^2)^{1/2}$<br>(b) $F(x) = e^x \cdot (x^5+x^2+1)$  | 5 | CO2 |

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| iii. | Evaluate the determinant.<br>$\begin{vmatrix} -4 & -5 & -7 \\ 1 & -6 & -1 \\ 0 & -2 & 1 \end{vmatrix}$   | 5 | CO2 |
| iv.  | The marginal revenue function of a commodity is given as $MR = 12 - 3x^2 + 4x$ . Find the total revenue and the corresponding demand function. | 5 | CO2 |

**SECTION-C**  
**3Qx10M=30 Marks**  
**(Attempt three questions)**

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| Q 3. |   |       |     |
| i.   | Find the three numbers of GP whose sum is 21 and whose product is 216.  | 10    | CO3 |
| ii.  | Evaluate the following Indefinite and definite integral:<br>(a) $\int (x^4 + e^x + 1/x) dx$<br>(b) $\int \log x \cdot x^2 dx$<br>(c) $\int_1^2 x e^x dx$  | 3+4+3 | CO3 |
| iii. | If $A = \begin{bmatrix} 3 & 5 \\ 9 & -6 \end{bmatrix}$ $B = \begin{bmatrix} 2 & 1 \\ -3 & 0 \end{bmatrix}$ . Prove that for any two invertible matrices A and of the same dimension, $(AB)^{-1} = B^{-1}A^{-1}$ . | 10    | CO3 |
| iv.  | Explain the steps in locating the maximum or minimum point of any function. Evaluate the critical point(s) of $f(x) = x^3 - 12x^2 + 36x - 4$ . Also, find the maximum or minimum of $f(x)$ .                      | 10    | CO3 |

**SECTION-D**  
**2Qx15M= 30 Marks**  
**(Attempt two questions)**

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| Q 4. |  |    |     |
| i.   | Solve the following system of equations using <b>Cramer's Rule</b> :<br>$5X - 2Y + 3Z = 16$<br>$2X + 3Y - 5Z = 2$<br>$4X - 5Y + 6Z = 7$  | 15 | CO4 |
| ii.  | The demand function for a product marketed by a company is $p = -3x^2 - 12x + 7$ ; where x is the number of units and p is the price per unit. At what value of x will there be maximum revenue? What is this maximum revenue? | 15 | CO4 |
| iii. | Find the inverse of the following matrix, if it exists:<br>$A = \begin{bmatrix} 1 & 9 & 4 \\ 7 & 8 & 6 \\ 7 & 3 & 1 \end{bmatrix}$   | 15 | CO4 |