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**BBA 181104**

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23737

2022

**B.B.A. 1<sup>st</sup> Semester End-Term Examination**

**BUSINESS MATHEMATICS**

Full Marks – 70

Time – Three hours

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

Answer question No. 1 and any *four* from the rest.

1. Fill in the gap : (10 × 1 = 10)
- (i) A matrix is said to be a \_\_\_\_\_ matrix when the diagonal element are equal to one and all off diagonal elements are zero.
  - (ii) Matrix addition or subtraction is not possible when the two matrices are of \_\_\_\_\_ order. (same/different)
  - (iii) If  $A = (y, a, b, x, 2)$  and  $B = (y, 2)$ , then  $B$  is a \_\_\_\_\_ of  $A$ .
  - (iv) If  $y = a \cdot x^n$ , then  $dy/dx$  is \_\_\_\_\_.
  - (v) If  $y = C \cdot x$  then  $dy/dx$  is \_\_\_\_\_.
  - (vi) If  $y = \log x$ , then  $dy/dx$  is \_\_\_\_\_.
  - (vii) If  $y = 2e^{3x}$ , then  $dy/dx$  is \_\_\_\_\_.
  - (viii) If a set contains no element than it is called \_\_\_\_\_ set.
  - (ix) If  $A = \{2,4,6,8,10\}$  and  $B = \{6,8,10,12, 14\}$  then  $A \cup B =$  \_\_\_\_\_.
  - (x) \_\_\_\_\_ is a diagram that shows all possible logical relations between a finite collection of different sets.
2. Find out  $x, y, z$  from the following set of equations using inverse of the matrix. Prove that results are same when we follow Cramer's Rule. (10+5)
- $$4x + 5y - z = 35$$
- $$2x + 3y + 2z = 35$$
- $$x + 4y + 2z = 36$$

[Turn over

3. (a) A firm's demand curve is given by  $P = 400 - 2.5q$ , where  $P$  is price and  $q$  is quantity demanded. Find the marginal revenue function and also find out the price at which marginal revenue is zero. What is AR? Find out. (7)
- (b) Find out the AC and MC from the following functions : (4+4=8)
- (i)  $TC = 1000 + 500q - 3q^2$
- (ii)  $TC = q^2 + 0.5q + 3$
- (Here,  $q$  is quantity.)
4. Find derivatives of the following functions : (5 × 3 = 15)
- (a)  $y = \frac{2x+5}{7x}$
- (b)  $y = \frac{5x+7}{\log x}$
- (c)  $y = (3x-2)(x^2+10x)$
- (d)  $y = (5-\sqrt{x})(5x^2+7)$
- (e)  $y = \frac{e^x}{2x+1}$
5. (a) Suppose that the total revenue and total cost function facing a firm is  $R = 30q - q^2$ ,  $C = q^3 - 15q^2 + 10q + 100$ . (3+2+2=7)
- Find out the
- (i) profit maximising output ( $q$ ) level
- (ii) maximum profit.
- (iii) profit maximising price
- (b) Define : (2+2+2+2=8)
- (i) Null Matrix
- (ii) Scalar Matrix
- (iii) Finite Set
- (iv) Triangular matrix.
6. (a) In a group of 50 people, 35 speaks Hindi, 25 speak both English and Hindi and all the people speak at least one of the two languages. How many people speak only English and not Hindi? How many people speak English?
- (b) Of the 120 borders of a hostel 100 drink tea, 40 drink coffee and 25 drink tea and coffee both. How many of them neither tea nor coffee?
- (c) If  $A = \{5\}$ ,  $B = \{5, \infty, 34, z\}$ ,  $C = \{5, 100, 9, z\}$  then  $A \cup (B \cup C) = ?$   
 $(A \cup B) \cup C = ?$  (6+5+4)