

09/3/20

FYBMS  
SEMESTER - 2

BUSINESS MATHEMATICS

Time : 2 1/2 hrs.

Marks:75

Note :

1. All questions are compulsory.
2. Figure to the right indicates marks.
3. Use of simple calculator is allowed.

Q1. (A) Fill in the blanks (any eight)

(08)

1. The rate of interest is \_\_\_\_\_, if Rs. 4000 amounts to Rs. 5200 at simple interest in 3 years.  
(3%, 7%, 2%, none of these)
2. \_\_\_\_\_ is the annuity in which payments are done at the start of each period.  
(immediate annuity, perpetual annuity, end annuity)
3.  $F(x) = 3x^2 + 3$  is a \_\_\_\_\_ type of function.  
(linear, quadratic, power, exponential)
4. The value of  $10!$  is \_\_\_\_\_.  
(1020, 10000, 100, none of these)
5. A diagonal matrix in which all diagonal elements are same is called \_\_\_\_\_ matrix.  
(diagonal, scalar, square, simple)
6. A square matrix whose determinant is non-zero is known as \_\_\_\_\_ matrix.  
(non-zero, singular, non-singular)
7. Derivative of  $f(x) = x^2 \cdot \log x$  is \_\_\_\_\_.  
( $2x + \log x$ ,  $\log x$ ,  $2x \log(x)$ , none of these)
8. The extra revenue that an additional unit of a product will earn is called \_\_\_\_\_ revenue.  
(total, selling, profit, none of these)
9. The process of obtaining the values of  $f(x)$  at points between the tabular values is called \_\_\_\_\_.  
(class-mark, class-width, none of these)
10. At break-even point, revenue = \_\_\_\_\_.  
(Cost, Profit, Price\*Demand)

(B) State True or False: (any 7)

(07)

1.  $a^x$  is not an exponential function, where  $a$  is a constant.
2. General order of a square matrix is  $m \times n$ .
3. Two matrices can only be multiplied if they have the same order.
4. An annuity in which the number of payments is fixed is known as fixed annuity.
5. Sinking fund is not a type of annuity.
6. Average revenue = total revenue / total quantity.
7. Inverse of a matrix exists if and only if it is a singular matrix.
8. For maxima to exist at a point, the second order derivative has to be greater than zero at the point.
9. When transpose of a matrix is equal to itself, it is known as symmetric matrix
10. The value of the determinant changes if rows and columns of a matrix are interchanged.



Q2.

- A. Machine X costs Rs. 5000 and has a useful life of 4 years. Machine Y costs Rs. 4000 and has a useful life of 3 years. Machine X is supposed to generate an annual savings of Rs. 2800 while machine Y is supposed to generate an annual savings of Rs. 3000. Assuming the time value of money is 10% p.a., which machine is preferable? (08)
- B. A company manufactures clock for which  $p = 1500 - 3x$  represents the demand function, where  $p$  is the price per unit of  $x$  units. The cost price involves initially a fixed cost of Rs. 38,400 and a variable cost of Rs. 420 per clock. Find the profit function. At what level of production does the company expect to recover its cost if for all the clocks produced, there is a demand? (07)

OR

- C. How many different words beginning and ending with a consonant can be formed out of the letters of the word 'CONSONANT'? Also find number ways can the letters of the word 'VERSION' be arranged, so that the consonants occupy only the odd places? (08)
- D. Find the present value of an immediate annuity of Rs. 50000 p.a. for 4 years with interest compounded at 8% p.a. (07)

Q3.

- A. If  $A = \begin{pmatrix} 2 & 1 & 3 \\ 4 & 0 & -1 \\ -3 & 2 & 1 \end{pmatrix}$ , and  $B = \begin{pmatrix} 1 & 2 & -1 \\ 4 & 3 & 0 \\ 2 & 3 & -2 \end{pmatrix}$ , find the matrix  $X$  such that  $2A + 3X = 5B$ . Also find  $A - 3B + 4X$ . (08)

- B. Find inverse of  $A = \begin{pmatrix} 1 & 2 & 5 \\ 1 & 3 & 5 \\ 1 & 5 & 12 \end{pmatrix}$  by using adjoint method. (07)

OR

- C. Solve the following equations simultaneously using Cramer's rule. (08)

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

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

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

- D. For the following Input-Output model, find the total output if demands are 120 and 240. (07)

Industry	Consumption by Industry		Final Demand	Total Output
	1	2		
1	100	80	20	200
2	80	280	40	400

Q4.

- A. Find derivative of the following with respect to  $x$ : (08)
- i)  $y = (5x^2 + 4x)(17x + 3\log x)$
- ii)  $y = (3a^x + 5) / (5x + 3e^x)$



- B. For a certain item, the cost function is  $C = 100 + (4000/x) + (x/10)$ , where  $x$  is the quantity. Determine the quantity for which the cost is minimum. (07)

OR

- C. The demand for a commodity when its price is  $x$  is given by  $y = (2x + 5) / (3x - 4)$ . Find the elasticity of demand when the price is 5 units. (07)
- D. For the function  $f(x)$ ,  $f(1) = 10$ ,  $f(2) = 16$ ,  $f(3) = 26$ ,  $f(4) = 40$ , estimate  $f(3.5)$  using Newton's backward difference interpolation formula. (08)

Q5.

- A. Construct forward difference table for  $x = 1, 2, 3, 4, 5$  and  $f(x) = x^4 + 3x^3 + 1$ . Find  $f(2.5)$  using Newton forward difference interpolation formula. (08)
- B. A person borrowed Rs. 10000 at 12% p.a. interest. If he is supposed to return the money within 2 years, find his EMI using (i) reducing balance method (ii) Flat-interest rate method. (07)

OR

- C. Write short notes: (Any 3). (15)
- Interest and its types
  - Permutation and Combination with an example
  - Cramer's Rule
  - Types of functions with example.
  - Forward and backward difference Method

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