

BUSINESS MATHEMATICS

Time: 2hrs.30Mins

[Marks: 75]

Q.1. Attempt both subparts A & B:

A) Write the appropriate answer (Any Eight)

1. A fund formed by periodically setting aside for money for the gradual repayment of a debt or replacement of a depreciating asset is known as :

- a) Resource Fund
- b) Emergency Fund
- c) Consistency Fund
- d) Sinking Fund

2. In EMI calculations, the rate of interest is compounded:

- a) Quarterly
- b) Yearly
- c) Monthly
- d) Six Monthly

3. A _____ is an arrangement of all or part of a set objects in a definite order.

- a) Permutation
- b) Function
- c) Combination
- d) Factorial

4. The point at which profit zero is called the:

- a) Zero point
- b) Break Even Point
- c) Odd Even Point
- d) Nominal Point

5. If the order of matrix A is $m \times p$ and the order of matrix B is $p \times n$. then the order of matrix AB is:

- a) $m \times n$
- b) $n \times m$
- c) $n \times p$
- d) $m \times p$

6. Inverse of a square matrix is possible only if determinant is:

- a) Zero
- b) Non Zero
- c) Sub Zero
- d) Almost Zero

7. Derivative of 'y' with respect of 'x' represents:

- a) Rate of change of y with respect to x
- b) Historical value of y with respect to x
- c) Distance of y with respect to x
- d) None of the above

8. The derivative of a derivative is called _____.
- Anti-derivative
 - Second order derivative
 - Secondary derivative
 - Super derivative
9. In Newton's Forward difference formula, what is u _____
- $u = (x-x_0)/h$
 - $u = (x-x_n)/h$
 - $u = (x-x^2)/h$
 - $u = (x-h)/h$

10. Interpretation is the process of:
- obtaining value of $f(x)$ at points between the tabular values
 - obtaining value of $f(x)$ at points beyond, either end of the tabular values
 - both of the above
 - none of the above

B) State whether the statements are True or False. (answer Any Seven)

- Give $P=Rs. 1500$, $N=3$ years, $I=Rs. 195$, then simple interest rate will be 4.33% p.a.
- The point where market demand equals market supply at the same price is called Balancing point.
- An annuity in which the number of payments is fixed is called Annuity.
- When a matrix is its own transpose, such a matrix is called a skew symmetric matrix.
- The value of a determinant is unchanged if its rows and columns are interchanged.
- If input-output analysis, $(I-A)$ is called the technology matrix.
- If total cost is known, then the cost of producing one additional unit is called average cost.
- $n! = n(n-1) !$
- At a stationary point, $\frac{dy}{dx} \neq 0$.
- Newton's interpolation Methods are applicable only when the differences between the independent variables are varying.

Q.2. A Find the equilibrium quantity and equilibrium price in the following cases:

- Given supply and demand equations, $p = \frac{2x}{100} + 2$ and $p = \frac{-8x}{100} + 12$ respectively.
- Given supply and demand equation of a product are $x_s = 4p + 4$ and $x_d = 100 - 8p$ respectively.

Q.2. B Vista industries create a fund to replace its present machinery with a new one in 8 years. The estimated cost of the new machinery at that time would be Rs. 21 lakh. The estimated scrap value of the present machinery after 8 years would be Rs. 1 lakh. Determine the amount to be deposited in the fund every quarter at 9% p.a. compounded quarterly. (Given $1.0225^{32} = 2.038$)

OR

Q.2. A The difference between the compounded interest and simple interest on a certain principal amount for 2 years 08 is Rs. 76.8. The simple interest on the same principle for 4 years is Rs. 3,840. Find the principal amount and the rate of interest.

Q.2. B There are 7 men and 3 ladies. Find the number of ways in which a committee of 6 can be formed from these, 07 if the committee is to include at least 2 ladies.

Q.3. A The input-output table for a two sector economy is given below:

Producing Sector	Consuming Sector		Final Demand
	S ₁	S ₂	
S ₁	20	15	65
S ₂	25	20	75

Find:

i. Leontief Matrix

ii. The total output from each of the sectors to meet a final demand for 80 units of S₁ and 100 units of S₂

Q.3. B If $A = \begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$ and $B = \begin{bmatrix} 0 & -i \\ i & 0 \end{bmatrix}$, where $i^2 = -1$. Verify that $(A + B)^2 = A^2 + B^2$

OR

Q.3. A Given $A^{-1} = \begin{pmatrix} 5/7 & 1/7 \\ 3/7 & 2/7 \end{pmatrix}$, using adjoint method find A and evaluate $A^2 + 2A$.

Q.3. B Solve the following equations using Cramer's Rule:

$$2x + y + z = 7.$$

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

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

Q.4. A A company has examined its cost structure and revenue structure and has determined that C the total cost, R total revenue and x the number of units produced are related as : $C = 100 + 0.015x^2$ and $R = 3x$

i. Write the Profit function.

ii. Find the production rate x that will maximize the profits of the company.

iii. Find the maximum profit.

Q.4. B Find the equation of the curve $y = f(x)$, where $f(x)$ is a second degree polynomial in x, passing through (0,3) (1,5), (2,9), (3,15) using the Newton's backward Difference interpolation method.

OR

Q.4. A Answer the following :

a. Show that the function $y = x^2 - 2x + 3$ has a minima at $x = 1$. Find the minimum value of the function.

b. Show that the function $y = 100 + 15x - 3x^2$ has maxima at $x = 5/2$. Find the maximum value of the function

Q.4. B For the data given below, find $f(2.5)$ using Newton's Forward Difference interpolation formula:

x	1	3	5	7
f(x)	0	25	86	201

- Q.5. A** Mr. Vijay takes a loan of Rs. 80,000 at 9% p.a. to be repaid in 6 monthly installments. Calculate the EMI and prepare the amortization table of payment.
- Q.5. B** The demand function for a commodity is given by $x=200-6p^2$. Find the price elasticity of demand when $p=5$.

OR

Q.5 Attempt any three

1. Bring out the difference between simple interest and compound interest.
2. Write a note on linear function, exponential function and Logarithmic function.
3. Write an example, explain Scalar Matrix and Upper Triangular Matrix.
4. Explain the terms, Present value and Future value in Annuity.
5. Explain the applications of Derivatives in Business Management.

SAPAN PARIKH COMMERCE CLASSES