

Please check whether you have got the right question paper.

- N.B:
1. All questions are compulsory.
 2. In Q.1 attempt both the sub-parts A & B.
 3. Figures to the right indicate marks.
 4. Use of non-programmable calculator is allowed.

Q.1 Attempt both subparts A & B:

08

A) Write the appropriate answer (Any Eight)

1. A fund formed by periodically setting aside money for the gradual repayment of a debt or replacement of a depreciating asset is known as:
 - a) Resource Fund
 - b) Emergency Fund
 - c) Contingency 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 is 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 its 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 _____.
 - a) Anti-derivative
 - b) Second order derivative
 - c) Secondary derivative
 - d) Super derivative

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 $(A+B)^2 = A^2 + B^2$ 07

OR

Q.3 P) Given $A^{-1} = \begin{pmatrix} 5/7 & 1/7 \\ 3/7 & 2/7 \end{pmatrix}$, using adjoint method find A and evaluate $A^2 + 2A$. 08

Q) Solve the following equations using Cramer's Rule: 07

$$\begin{aligned} 2x + y + z &= 7 \\ 3x - y - z &= -2 \\ x + 2y - 3z &= -4 \end{aligned}$$

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.

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 Newton's backward Difference Interpolation method. 07

OR

Q.4 P) Answer the following: 08

- 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 a maxima at $x=5/2$. Find the maximum value of the function.
- c.

Q) For the data given below, find $f(2.5)$ using Newton's Forward Difference interpolation formula: 07

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

Q.5 Attempt either A or B:

- A) 1. 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 repayment. 08
2. The demand function for a commodity is given by $x=200-6p^2$. Find the price elasticity of demand when $p=5$. 07

OR

B) Attempt any three: 15

1. Bring out the difference between simple interest and compound interest
2. Write a note on linear function, exponential function and Logarithmic function
3. With 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.