Board Question Paper April 2017



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 x p and the order of matrix B is px n. then the order of matrix AB is:
 - **a)** m X n
 - **b)** n X m
 - **c)** n X p
 - **d)** m x 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

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- 8. The derivative of a derivative is called
 - a) Anti-derivative
 - **b)** Second order derivative
 - c) Secondary derivative
 - d) Super derivative
- 9. In Newton's Forward difference formula , what is u _____
 - **a)** $u = (x x_0)/h$
 - **b)** $u = (x x_n)/h$
 - **c)** $u = (x x^2)/h$
 - **d)** u = (×-h)/h
- **10.** Interpretation is the process of:
 - a) obtaining value of f (x) at points between the tabular values
 - b) obtaining value of f (×) at points beyond, either end of the tabular values
 - c) both of the above
 - d) 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.
- 3) An annuity in which the number of payments is fixed is called Annuity.
- **4)** When a matrix is its own transpose, such a matrix is called a skew symmetric matrix.
- 5) The value of a determinant is unchanged if its rows and columns are interchanged.
- 6) If input-output analysis, (I-A) is called the technology matrix.
- 7) If total cost is known, then the cost of producing one additional unit is called average cost.
- **8)** n! = n(n-1) !
- **9)** At a stationary point, $\frac{dy}{dx} \neq 0$.
- **10)** 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:
 - **a.** Given supply and demand equations, $p\frac{2x}{100} + 2$ and $p = \frac{-8x}{100} + 12$ respectively.
 - **b.** Given supply and demand equation of a product are $x_s = 4p + 4$ and $x_d = 100-8$ prespectively.
- Q.2. B Vista industries create a fund to replace its present machinery with a new one in 8 years. The estimated cost 07 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. a compounded quarterly. (Given 1.0225³² = 2.038)

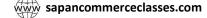
OR

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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.

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- **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 $S_1 and \ 100 \ units \ of \ S_2$

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 : $C=100+0.015\times^2$ 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 $y=100+15x-3\times^2$ 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:

Γ	Х	1	3	5	7
	f(x)	0	25	86	201

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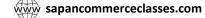
- Q.5. A Mr. Vijay takes a loan of Rs. 80,000 at 9% p.a. to be repaid in 6 monthly installments. Calculate the EMI and prepare the amortization table of payment.
- The demand function for a commodity is given by $x=200-6p^2$. Find the price **O.5.** B elasticity of demand when p=5.

OR

Attempt any three **Q.5**

- 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.

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