NE-106

November-2017

B.B.A., Sem.-II

CC-112 : Business Mathematics

Time : 3 Hours]   [Max. Marks : 70

1. (A) Differentiate the following with respect to x :   7

      (i) $(3x - 5)(x - 7)(2x + 4)$

      (ii) $x^5 \cdot e^x \cdot \log x$

              OR

      Differentiate the following with respect to x :   7

      (i) $\dfrac{5}{(x + 3)(x - 5)}$

      (ii) $\dfrac{(3x + 5)}{(2x - 7)}$

   (B) Differentiate with respect to x : $y = (\log x)^x$ 7

              OR

      Do the following :

      (i) State the rule of division.   2

      (ii) State the definition of derivative and find derivative of $y = (3x^4 - 5x)$ by
using definition.   5

2. (A) The demand function faced by a company is $P = 1500 - 0.6\,x$ and its cost function
is $C = 50\,x + 25{,}000$. (P = price, x = output, C = cost). Find the output at which
the profits are maximum. Also find the price it will charge.   7

              OR

      (i) Explain Elasticity of Demand.   2

      (ii) If the supply function is $x = 10 + 6p^2$, find the elasticity of supply. Also find
the elasticity of supply when (i) p = 5, (ii) p = 10.   5

(B) Find $\frac{\partial u}{\partial x}$, $\frac{\partial^2 u}{\partial x^2}$, $\frac{\partial u}{\partial y}$ and $\frac{\partial^2 u}{\partial y^2}$ for u = $x^5 + 5x^3y^2 + 10x^2 y^5 + y^5$.   7

OR

If z = f(a + bx) + g(a − bx), then prove that $\frac{\partial^2 z}{\partial x^2}$ = b^2. $\left(\frac{\partial^2 u}{\partial a^2}\right)$.

3. (A) Explain the following :   7

   (i)   Symmetric Matrix with an example.

   (ii) Rule of Matrix multiplication.

   (iii) Adjoint of a Matrix.

   OR

   (i)   Differentiate : Matrix v/s Determinant.   5

   (ii) Skew-symmetric Matrix with an example.   2

   (B) Find out : (i) 3A + 5B − 2C   (ii) B^2 for the following given matrices :   7

   $A = \begin{bmatrix} 2 & 1 & 4 \\ 0 & -5 & 9 \\ 7 & 8 & 4 \end{bmatrix}$ $B = \begin{bmatrix} 1 & 5 & 7 \\ -3 & -6 & 4 \\ 2 & 11 & 4 \end{bmatrix}$ $C = \begin{bmatrix} 1 & 3 & -1 \\ 2 & 7 & -5 \\ 0 & 1 & -9 \end{bmatrix}$

   OR

   Solve the following equation by using inverse method and find the values of x, y and z.

   $x − 2y + 3z = 4$; $2x + y − 3z = 5$; $−x + y + 2z = 3$

4. (A) Raghav borrows ₹ 25,000 for 10 years at 8.5% simple interest. Madhav borrows the same amount for the same duration at 8.5% compound interest. Find the difference of interest. Find amount of interest if the interest is calculated (i) Half-annually, (ii) Quarterly, (iii) Monthly.   7

   OR

   Explain the following :

   (i)   Effective rate of interest

   (ii) Future value of annuity

   (iii) Perpetuity

(B) Vishal has purchased a car worth ₹ 5,00,000. It's expected life is 10 years. It is estimated that after 10 years, the price of car will increase by 40%. To buy a new car, it has been decided to create a sinking fund and invest it at 12% rate of interest. Find the sum to be transferred to the sinking fund every year. **7**

OR

Sarvajanik Trust wishes to award a annual prizes to students getting highest score in HSC examinations of the Mehsana District. If it costs ₹ 3,40,000 every year and the rate of compound interest is 9.5%, what amount trust is required to deposit ?

5. Answer the following : **14**

(1) Define : Sinking fund.

(2) If y = $15x^4 - 5x^3 - 100$, then find $\dfrac{dy}{dx}$.

(3) Define : Partial deviation.

(4) Find partial derivative w.r.to y for z = $7x^2 - 2xy^2 - 4xy^5$.

(5) Give formula of Marginal revenue and Average cost.

(6) Define : Chain Rule of Derivative.

(7) Write a matrix of order 5 * 2.

(8) To multiply two matrices A and B, rows of matrix A should be equal to columns of B. (T/F).

(9) Value of determinant for the given matrix can never be Zero. (T/F).

(10) To obtain minimum value of a given function, value of second order derivative must be less than zero. (T/F).

(11) Define : Marginal Cost.

(12) Define : Identity Matrix.

(13) Define : Determinant of a given matrix.

(14) Define : Second order derivative.

———————

NE-106   4