

Seat No. : _____

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) $\frac{5}{(x + 3)(x - 5)}$

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

(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 $P = 1500 - 0.6x$ and its cost function is $C = 50x + 25,000$. (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 $u = x^5 + 5x^3y^2 + 10x^2y^5 + y^5$. 7

OR

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

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

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

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 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 $\frac{dy}{dx}$.
 - (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.
-

