

**B.A. DEGREE EXAMINATION, APRIL 2020**  
**III Year V Semester**  
**Mathematics for Economists**

**Time : 3 Hours**

**Max.marks :75**

**Section A** ( $10 \times 2 = 20$ ) Marks

Answer any **TEN** questions

1. If  $A = \begin{bmatrix} 1 & -1 \\ 2 & -1 \end{bmatrix}$ , find  $A^2$ .
2. Find the value of the determinant of  $\begin{bmatrix} x & x \\ 1 & -x \end{bmatrix}$ .
3. State Hawkins-Simon condition.
4. What is input-output Analysis.
5. Find  $\frac{dy}{dx}$ , if  $y = (4x^3 + 2x)(3x^2 + 4)$
6. Find  $\frac{dy}{dx}$  if  $y = (3 + 2x^2)^3$ .
7. State any 2 applications of maxima & minima in Economics.
8. Define marginal cost curve.
9. State any 2 applications of partial derivative in Economics.
10. Find the partial derivative of  $z = 4x^2 + y^2 + 4xy$ .
11. If  $A = \begin{bmatrix} 2 & 0 \\ -5 & 6 \end{bmatrix}$  and  $B = \begin{bmatrix} -3 & 6 \\ 4 & 1 \end{bmatrix}$  find  $A+B$ .
12. Define cost and revenue function.

**Section B** ( $5 \times 5 = 25$ ) Marks

Answer any **FIVE** questions

13. Prove that  $\begin{vmatrix} a+b+2c & a & b \\ c & b+c+2a & b \\ c & a & c+a+2b \end{vmatrix} = 2(a+b+c)^3$
14. Given  $A = \begin{bmatrix} 0.4 & 0.1 \\ 0.7 & 0.6 \end{bmatrix}$  and the final demand is 50 and 100, Find the gross output.
15. If  $xy = a + bx$  then show that  $x \frac{d^2y}{dx^2} + 2 \frac{dy}{dx} = 0$

16. Discuss about Total, Average and Marginal cost curves and Revenue curves.
17. Discuss the application of partial derivative in Economics.
18. Let  $A = \begin{bmatrix} 2 & 4 \\ 3 & 2 \end{bmatrix}$  and  $B = \begin{bmatrix} 1 & 0 \\ 3 & 2 \end{bmatrix}$  verify  $(A + B)^T = A^T + B^T$  where  $A^T$  is transpose of A,  $B^T$  is the transpose of B.
19. Find the maximum and minimum value of the function  $y = x^3 - 3x + 1$ .

**Section C** ( $3 \times 10 = 30$ ) Marks

Answer any **THREE** questions

20. Using Cramer's rule, solve the set of equations  

$$\begin{aligned} x - 2y + 3z &= 1 \\ 3x - y + 4z &= 3 \\ 2y + y - 2z &= -1 \end{aligned}$$
21. Illustrate the concept of Input-Output Analysis with suitable example. Also, mention its application and limitations.
22. a)  $y = \sqrt{\frac{1-x}{1+x}}$ , show that  $(1 - x^2) \frac{dy}{dx} + y = 0$  b) If  $f(x) = x^3 - 5x^2 + 7$  then find  $f'(x)$ ,  $f'(1)$  and  $f'(2)$ . For what value of  $x$  does  $f'(x)$  vanish?
23. The total cost  $C$  of the output  $x$  is given by  $C = \frac{2}{3}x + \frac{35}{2}$ .  
Find
  1. Cost when output is 4 units
  2. Average cost of output of 10 units
  3. Marginal cost when output is 3 units.
24. Examine the function,  $z = 16 - (x + 2)^2 - (y - 2)^2$  for maximum and minimum value.

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