

S.No.: 373

BATCH: 87 - 2017

Reg. No.:

END OF SEMESTER EXAMINATIONS, NOVEMBER - 2018

MATHEMATICAL METHODS

SUBJECT CODE : 12UAEC05/17UAEC05

MAJOR : B.A. (Economics)

TIME : 3 HOURS

SEMESTER : III

MAX. MARKS: 75

**SECTION - A (10 x 1 = 10)**

**Answer ALL the Questions:**

1. Give the equation of a circle with centre (1,-1) and radius  $\sqrt{2}$  units.
2. Find the distance between the two points (1,4) and (4,8).
3. If  $y = 5x^5 + 4x + 2$ , find  $\frac{dy}{dx}$ .
4. If  $z = 4x^2 + 4xy + y^2$ , find  $\frac{\partial z}{\partial x}$  and  $\frac{\partial z}{\partial y}$ .
5. State the meaning of revenue function.
6. Find  $n$  if  $AR$  is Rs. 20 and  $MR$  is Rs. 10.
7. If  $A = \begin{bmatrix} 1 & 2 & -3 \\ 0 & -1 & 2 \\ 3 & 0 & 4 \end{bmatrix}$  and  $B = \begin{bmatrix} -1 & 3 & 4 \\ 6 & 2 & 0 \\ 2 & 1 & 3 \end{bmatrix}$  find  $A + B$ .
8. Mention the various types of matrices.
9. What is Cramer's rule?
10. Write the equations in matrix form.

$$2x - 4y + 3z = 3$$

$$4x - 6y + 5z = 2$$

$$-2x + y - z = 1$$

**SECTION - B (5 x 4 = 20)**

**Answer any FIVE Questions:**

11. Calculate the equation of the straight line passing through the points (4,5) and having a slope 6.
12. Find  $\frac{dy}{dx}$  if  $y = (x^3 + 3)(2x^2 - 3x^3)$ .
13. Find the maxima or minima of the function  $y = x^2 - 4x - 5$ .
14. For the total utility function  $U = (x + 7)(3x + 9y)$  find marginal utilities of  $x$  and  $y$  at  $x = 1$  and  $y = 2$ .
15. Find the elasticity of demand, when the demand function  $q = \frac{20}{p+1}$  and  $p = 3$ .

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16. Verify whether  $AB = BA$  for the matrices.

$$A = \begin{bmatrix} 2 & 1 & 0 \\ 1 & -1 & 2 \\ 0 & 1 & 3 \end{bmatrix} \text{ and } B = \begin{bmatrix} 1 & 2 & -1 \\ -2 & 0 & 1 \\ 1 & 1 & 2 \end{bmatrix}$$

17. Find the inverse of the matrix  $A = \begin{bmatrix} 2 & 1 \\ 3 & 4 \end{bmatrix}$ .

18. Solve the following set of linear simultaneous equations.

$$2x_1 + 3x_2 = 5$$

$$11x_1 - 5x_2 = 6$$

### **SECTION – C (3 x 15 = 45)**

#### **Answer any THREE Questions:**

19.a) Obtain the equation of the straight line having X and Y intercepts  $\frac{2}{3}$  and  $\frac{3}{2}$  respectively.

b) Solve the following Quadratic equation by completing the square.

$$4x^2 - 12x + 9 = 0$$

20. Investigate the maximum or minimum values of the following function.

$$z = 48 - 4x^2 - 2y^2 + 16x + 12y$$

21. Given the demand and the average cost functions of a monopolistic firm as

$$p = 32 - 3q, \quad AC = q + 8 + \frac{5}{q}, \quad \text{what level of output maximizes total profit and what}$$

are corresponding values of  $R, AR, MR, C, AC, MC$  and profit.

$$22. \text{ Given } A = \begin{bmatrix} 8 & 1 & -2 \\ -9 & 9 & 9 \\ 6 & -3 & 9 \end{bmatrix} \quad B = \begin{bmatrix} 1 & -2 & 3 \\ 5 & 6 & -4 \\ 7 & -9 & 8 \end{bmatrix} \quad C = \begin{bmatrix} 4 & -3 & 1 \\ 6 & 2 & -1 \\ 0 & -4 & 3 \end{bmatrix}$$

show that  $A(B+C) = AB + AC$ .

23. Solve the following equations by using Cramer's rule.

$$2x_1 + 3x_2 - x_3 = 9$$

$$x_1 + x_2 + x_3 = 9$$

$$3x_1 - x_2 - x_3 = -1$$

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