Reg.No. :

I.Answer all the questions.

II.Use Blue pen only.

Time : 01:00:00 Hrs

Total Marks : 95

## Section-A

3 x 1 = 3

1) If $f(x, y) = 2x + ye^{-x}$, then $f_y(1, 0)$ is equal to

   (a) e   (b) $\frac{1}{e}$   (c) $e^2$   (d) $\frac{1}{e^2}$

2) If $f(x, y) = x^3 + y^3 + 3xy$ then $f_{xy}$ is

   (a) 6x   (b) 6y   (c) 2   (d) 3

3) The elasticity of demand when marginal revenue is zero, is

   (a) 1   (b) 2   (c) -5   (d) 0

## Section-B

5 x 6 = 30

4) The cost function, when the output is x, is given by $C = x(2e^x + e^x)$. Show that the minimum avertage cost is $2\sqrt{2}$.

5) Find EOQ for the data given below.Also verify that carrying costs is equal to to ordering costs at EOQ.

| Item | Montly Requirement | Ordering cost per order | Carrying cost Per unit |
|------|--------------------|-----------------------|------------------------|
| A | 9000 | Rs. 200 | Rs. 3.60 |
| B | 25000 | Rs. 648 | Rs. 10.00 |
| C | 8000 | Rs. 100 | Rs. 0.60 |

6) If $u = x^3 + y^3 + z^3 - 3xyz$, prove that $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} + z\frac{\partial u}{\partial z} = 3u$

7) If $u = x^2y + y^2z + z^2x$, show that $\frac{\partial u}{\partial x} + \frac{\partial u}{\partial y} + \frac{\partial u}{\partial z} = (x + y + z)^2$

8) If $u = log\sqrt{x^2 + y^2}$, show that $\left(\frac{\partial u}{\partial x}\right)^2 + \left(\frac{\partial u}{\partial y}\right)^2 = \frac{1}{x^2+y^2}$

## Section-C

5 x 10 = 50

9) A firm has revenue function $R = 8x$ and a production cost function $C = 150000 + 60\left(\frac{x^2}{900}\right)$. Find the total profit function and the number of units to be sold to get the maximum profit.

10) A radio manufacturer finds that he can sell x radios per week at a Rs. p each,where $p = 2(100 - \frac{x}{4})$.His cost of production of x radios per week is $Rs. (120x + \frac{x^2}{4})$.Show that his profit is maximum is when the production is 40 radios per week.Find also his maximum profit per week.

11) A manufacturer can sell x items per week at a price of $p = 600 - 4x$ rupees. Production cost of x items works out to Rs.C where $C = 40x + 2000$. How much production will yield maximum profit?

12) Find the optimum output of a firm whose total revenue and total cost functions are given by $R = 30x - x^2$ and $C = 20 + 4x$, x being the output of the firm.

13) Calculate the EOQ in units and total variable cost for the following items,assuming an ordering cost of Rs.5 and a holding cost of 10%

| Item | Annual demand | Unit price (Rs.) |
|------|---------------|------------------|
| A | 460 Units | 1.00 |
| B | 392 Units | 8.60 |
| C | 800 Units | 0.02 |
| D | 1500 Units | 0.52 |

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