

Model Question Paper
Application of differentiation- II - Part IV
12th Standard

Business Maths

Reg.No. :

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I. Answer all the questions.

II. Use Blue pen only.

Time : 01:20:00 Hrs

Total Marks : 110

4 x 1 = 4

Section-A

- 1) The marginal productivity of labour (L) for the production function $P = 15K - L^2 + 2KL$ when $L = 3$ and $K = 4$ is
(a) 21 (b) 12 (c) 2 (d) 3
- 2) The production function for a firm is $P = 3L^2 - 5KL + 2k^2$. The marginal productivity of capital (K) when $L = 2$ and $K = 3$ is
(a) 5 (b) 3 (c) 6 (d) 2
- 3) The cost function $y = 40 - 4x + x^2$ is minimum when x
(a) $x = 2$ (b) $x = -2$ (c) $x = 4$ (d) $x = -4$
- 4) If $R = 5000$ units / year, $C_1 = 20$ paise, $C_3 = Rs. 20$ then EOQ is
(a) 1000 (b) 5000 (c) 200 (d) 100

Section-B

5 x 6 = 30

- 5) Find the stationary points and the stationary values of the function $f(x) = x^3 - 3x^2 - 9x + 5$.
- 6) Investigate the maxima and minima of the function $2x^3 + 3x^2 - 36x + 10$.
- 7) Find the points of inflection of the curve $y = 2x^4 - 4x^3 + 3$.
- 8) A certain manufacturing concern has total cost function $= 15 + 9x - 6x^2 + x^3$. Find x , when the total cost is minimum.
- 9) Find the marginal productivities of capital (K) and labour (L), if $P = 10K - K^2 + KL$, when $K = 2$ and $L = 6$.

Section-C

7 x 10 = 70

- 10) A company uses annually 24,000 units of raw materials which costs Rs. 1.25 per unit, placing each order costs Rs. 22.50 and the holding cost is 5.4% per year of the average inventory. Find the EOQ, time between each order, total number of orders per year. Also verify that at EOQ carrying cost is equal to ordering cost.
- 11) A manufacturing company purchases 9000 parts of a machine for its annual requirements. Each part costs Rs. 20. The ordering cost order is Rs. 15 and carrying charges are 15% of the average inventory per year.
- 12) If $u = \log \sqrt{x^2 + y^2 + z^2}$, then prove that $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} + \frac{\partial^2 u}{\partial z^2} = \frac{1}{x^2 + y^2 + z^2}$.
- 13) Using Euler's theorem if $u = \log \frac{x^4 + y^4}{x - y}$ show that $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = 3$.
- 14) The revenue derived from selling x calculators and y adding machines is given by $R(x, y) = -x^2 + 8x - 2y^2 + 6y + 2xy + 50$. If 4 calculators and 3 adding machines are sold, find the marginal revenue of selling (i) one more calculator (ii) one more adding machine.
- 15) For some firm, the number of units produced when using x units of labour and y units of capital is given by the production function $f(x, y) = 80x^{\frac{1}{4}}y^{\frac{3}{4}}$. Find (i) the equations for both marginal productivities. (ii) Evaluate and interpret the results when 625 units of labour and 81 units of capital are used.
- 16) The demand for a commodity A is $q_1 = 240 - p_1^2 + 6p_2 - p_1p_2$. Find the partial Elasticities $\frac{Eq_1}{Ep_1}$ and $\frac{Eq_2}{Ep_2}$ when $p_1 = 5$ and $p_2 = 4$.
