

Model Question Paper
Application of differentiation- II - Part II

12th Standard

Business Maths

Reg.No. :

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I. Answer all the questions.

II. Use Blue pen only.

Time : 01:00:00 Hrs

Total Marks : 90

4 x 1 = 4

Section-A

- 1) If $u = e^{x^2+y^2}$, then $\frac{\partial u}{\partial x}$ is equal to
(a) y^2u (b) x^2u (c) $2xu$ (d) $2yu$
- 2) If $u = \log(e^x + e^y)$ then $\frac{\partial u}{\partial x} + \frac{\partial u}{\partial y}$ is equal to
(a) $\frac{1}{e^x+e^y}$ (b) $\frac{e^x}{e^x+e^y}$ (c) 1 (d) $e^x + e^y$
- 3) If $u = x^y (x > 0)$ then $\frac{\partial u}{\partial y}$ is equal to
(a) $x^y \log x$ (b) $\log x$ (c) $y^x \log x$ (d) $\log y^x$
- 4) $f(x, y) = \frac{x^{\frac{1}{2} + y^{\frac{1}{2}}}}{x^{\frac{1}{3} + y^{\frac{1}{3}}}}$ is a homogeneous function of degree
(a) $\frac{1}{2}$ (b) $\frac{1}{3}$ (c) $\frac{1}{6}$ (d) $\frac{1}{5}$

Section-B

3 x 6 = 18

- 5) Determine the value of output q at which the cost function $C = q^2 - 6q + 120$ is minimum.
- 6) Find the maximum and the minimum values of the function $x^5 - 5x^4 + 5x^3 - 1$. Discuss its nature at $x = 0$.
- 7) Show that the function $f(x) = x^2 + \frac{250}{x}$ has a minimum value at $x = 5$

Section-C

7 x 10 = 70

- 8) The total revenue (TR) for commodity x is $TR = 12x + \frac{x^2}{2} - \frac{x^3}{3}$. Show that at the highest point of average revenue (AR), $AR=MR$ (where MR =Marginal Revenue).
- 9) A firm produces x units of output per week at a total cost of Rs. $(\frac{1}{3}x^3 - x^2 + 5x + 3)$. Find the level at which the marginal cost and the average variable cost attain their respective minimum.
- 10) It is known that in a mill the number of labourers x and the total cost C are related by $C = \frac{3}{2(x-4)} + \frac{3}{32}x$. What value of x will minimise the cost?
- 11) $R = 21x - x^2$ and $C = \frac{x^3}{3} - 3x^2 + 9x + 16$ are respectively the sales revenue and cost function of x units sold. Find (i) At what output the revenue is maximum? What is the total revenue at this point? (ii) What is the marginal cost at a minimum? (iii) What output will maximise the profit?
- 12) 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.
- 13) 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.
- 14) a) A certain manufacturing concern has the total cost function $C = \frac{1}{5}x^2 - 6x + 100$. Find when the total cost is minimum.
b) A firm produces an output of x tons of a certain product at a total cost given by $C = 300x - 10x^2 + \frac{1}{3}x^3$. Find the output at which the average cost is least and the corresponding value of the average cost.
