Vidya Vikas Mandal's
Shree Damodar College of Commerce & Economics, Margao-Goa
FY B.Com, Semester-II, Supplementary Examination August 2022
Commercial Arithmetic- II (CC8)

Max Marks: 80

<u>Duration: 2hrs</u>

Instructions:

1) Start each question on fresh page.
2) Figures to the right indicate maximum marks.
3) All the questions are compulsory. (Internal choice is provided)
4) Graph papers will be provided on request.
5) Use of non-programmable calculators is allowed.

5 x 4

Q 1   Attempt the following questions.

a) The Utility function for a group of consumers is given by $U(x,y) = 3x^2 + 4x^3y^3 + 4y^4 + 60$. Find the marginal utilities at $x = 6$ and $y = 8$.

b) Find the total revenue if the marginal revenue is given by $MR = -4x^3 + 3x^2 + 1$.

c) Find $\frac{dy}{dx}$ if

i) $y = 9x + e^x + 2logx$

ii) $y = \frac{1}{(6x+8)^3}$

d) Using distance formula, show that the points A(-2, 4) , B(-4, 4), C(-1, -5) and D (1, -5) are the vertices of a parallelogram.

e)
If $f(x) = \begin{cases} 3x^2 + 2x + 1 & ; 0 \le x \le 2 \\ 4x - 3 & ; 2 < x \le 4 \\ x^2 - 1 & ; 4 < x \le 6 \end{cases}$

Find $f(1)$, $f(3)$, $f(5)$ & $f(2)$.

OR

Q I   Attempt the following questions.

5 x 4

v) The marginal cost is $MC = 5x^2 + 4x + 8$, find the total cost if the fixed cost is 60.

w) Find all the second order partial derivatives of the function $f(x,y) = \frac{x}{y}$.

x) Find $\frac{dy}{dx}$ if

i) $y = x(2x + 3)$

ii) $y = \frac{x+6}{x}$

y) If C=(P, -7), D =(2, 5) and d(CD) =13 , find P.

z) Find the domain and range of the functions:

i) $f(x) = -x^2$ 　　　　　　　　　　　　ii) $f(x) = 3$

Q 2　Attempt the following questions.

<div align="right">5 x 4</div>

a) Find the equation of the line perpendicular to $y - 3x + 6 = 0$ and having y intercept 3.

b) Find the value of:

　　i) $\int_0^5 \frac{x^2 - 5x + 6}{x - 3}\, dx$ 　　　　　　ii) $\int_0^1 e^x\, dx$

c) If the production function is $Q = L^3 - 2KL + k^4$ where L is the labor and K is the capital, find the marginal physical productivity of labor and capital at $L = 2$ and $K = 3$.

d) The point Q (-4,1) divides the line segment joining the points A(2,-2) and B in the ratio 3:5 internally. Find the coordinates of B.

e) Find the values of x for which the function $f(x) = x^3 - 48x + 6$ is
　　i)　　Increasing 　　　　　　　　　　ii) decreasing

<div align="center">OR</div>

Q II　Attempt the following questions.

<div align="right">5 x 4</div>

v) Find the value of :

　　i)　　$\int_1^2 3x + 9\, dx$ 　　　　　　ii) $\int_{-1}^1 x(x - 2)\, dx$

w) Show that the function $f(x) = \frac{1}{x} + 8$ is always decreasing for all real numbers except $x = 0$.

x) Find the equation of the line passing through the intersection of the lines $2x - 4y = 10$ and $3x + y = 1$ and having slope $\frac{1}{2}$.

y) If $Z = 2x^3 + 6xy + 3y^4$, find all its partial derivatives up to order 2.

z) If B (1,3) is the midpoint of the segment AC where A (6,-2) and C(x,8). Find x.

Q 3　Attempt the following questions.

<div align="right">5 x 4</div>

a) The demand and supply functions are $p = x^2 - 12$ and $p = 6 + \frac{x^2}{2}$ respectively. Find the Producer's surplus under market equilibrium.

b) Find the values of x for which the function $f(x) = x^3 - 9x^2 + 24x - 12$ has its maxima and minima.

c) Using the concept of slopes, show that A(4,4), B(3,5), C(-1,1) are vertices of right angled triangle.

d) Evaluate:

$\lim_{x \to 8} \frac{2x^2 - 17x + 8}{8 - x}$

e) The demand function is given by $p = 25 + 13D - D^2$. Find the total revenue and marginal revenue.

Q III   Attempt the following questions.   5 x 4

v)   Using the concept of slopes, show that the points (3,0), (2,3) and (-1,12) are collinear.

w)   The cost of producing x items is given by $C = 12x + 50x^2 + 2$. Find the marginal cost and the average cost.

x)   Evaluate:
$$\lim_{x \to 0} \frac{x}{3 - \sqrt{x+9}}$$

y)   If the demand function is $p = -6x + 24$, Find the Consumer's surplus at $x = 2$.

z)   Find the points of maxima and minima of the function $f(x) = 2x^3 - 15x^2 + 36x + 10$.

Q4   Attempt the following questions.   5 x 4

a)   Find $\frac{d^2 y}{dx^2}$ if $y = 3^x + 6logx + 19x^5$

b)   Check the continuity of the function $f(x) = \begin{cases} \frac{2x^2 - 3x - 2}{x - 2} & ; \ x \neq 2 \\ 5 & x = 2 \end{cases}$ at $x = 2$

c)   Find the equation of the line passing through (0,-3) and perpendicular to the line joining the points (-3, 2) and (9, 1)

d)   Evaluate:
   i) $\int (3 - 7x)^2 \, dx$ ii) $\int 8^x \, dx$

e)   Solve the following LPP graphically.
   $Max \ Z = 3x + 2y$
   $s.t \ \ 2x + y \leq 100$
   $\quad \quad x + y \leq 80$
   $\quad \quad x \leq 40$
   $\quad \quad x, y \geq 0$

Q IV   Attempt the following questions.   5 x 4

v)   Find $\frac{d^2 y}{dx^2}$ if $y = \frac{1}{(2x+8)^8} + \sqrt{x}$

w)   Find the equation of the line passing through (-1, -2) and perpendicular to $3x + 8y = 12$.

x)   If the function $f(x) = \begin{cases} 2ax + b & ; x > 1 \\ 13 & ; x = 1 \\ 5ax - 3b & ; x > 1 \end{cases}$ is continuous at $x = 1$, find a and b.

y) Evaluate:

i) $\int \sqrt{2x+7}\ dx$

ii) $\int 3^x - 1\ dx$

z) Solve the following LPP graphically.

Min $Z = 2x - y$

s.t $x + y \le 5$

$x + 2y \le 8$

$x, y \ge 0$