

Vidya Vikas Mandal's
Shree Damodar College of Commerce & Economics, Margao-Goa
FY B.Com, Semester-II, Supplementary Examination June 2023
(Truncated syllabus 2021-22)
Commercial Arithmetic -II (CC 8)

Duration: 2hrs

Max Marks: 80

Instructions:

- 1) Start each question on fresh page.
- 2) Figures to the right indicate maximum marks.
- 3) Non programmable calculator is allowed.
- 4) Graph paper can be used wherever applicable.

Q 1) Attempt the following questions.

5X4=20

- a) If $P = (3,3)$, $Q = (9,0)$ and $R = (12,21)$ are the vertices of a triangle PQR. Show that it is a right angled triangle.
- b) Differentiate the following $y = e^x (x^2 - 3x + 2)$
- c) Find the value of $\int_1^3 (3x^2 + 2x + 1) dx$
- d) If $Z = x^3 + 3xy^2 + y$ then find $\frac{\partial z}{\partial x}$ and $\frac{\partial z}{\partial y}$
- e) The demand law is given as $P = 15 - 2D - D^2$. Find the consumers surplus when the demand is 2.

OR

Q 1) Attempt the following questions.

5X4=20

- i) The equation of a line is $3x - 7y + 5 = 0$. Find
 - a) Slope of a line
 - b) the x-intercept
 - c) the y-intercept
- ii) The total cost of producing x items by a firm is $C = 400 + 0.02x + 0.0001x^2$. Find
 - a) average cost
 - b) marginal cost at $x = 10$
- iii) Evaluate the integral $\int (x^3 + 3x^2 - 2x + 5) dx$
- iv) Given $Z = x^2 + y^2 - 5$, find $\frac{\partial z}{\partial x}$ and $\frac{\partial z}{\partial y}$ at the point (1,3).
- v) Find the coordinates of point P which divides the line segment RS externally in the ratio 4:5 where $R = (4,9)$, $S = (2,4)$.

5X4=20

Q 2) Attempt the following questions.

a) Solve the linear programming problem by graphical method

$$\begin{aligned} \text{Max } Z &= 5x + 7y \\ \text{s.t. } & x + y \leq 4 \\ & 3x + 8y \leq 24 \\ & 10x + 7y \leq 35, \quad x \geq 0 \text{ and } y \geq 0. \end{aligned}$$

b) Find the domain and range of the function given by $f(x) = 4x - 1, 1 \leq x \leq 5$.

c) If $y = 3^x$, find $\frac{dy}{dx}, \frac{d^2y}{dx^2}$ and $\frac{d^3y}{dx^3}$

d) Find $\frac{\partial z}{\partial x}$ and $\frac{\partial z}{\partial y}$ if $z = 2x^3 - 11x^2y + 3y^3$

e) Find the coordinates of the point dividing the segment joining the point $(-5, -3), (2, -4)$ internally in the ratio 2:3.

OR

Q II) Attempt the following questions.

5X4=20

i) Find the equation of a line having y - intercept -5 and perpendicular to the line $3x - 4y + 12 = 0$

ii) Find the ratio in which the line segment joining $A = (7, 8)$ and $B = (-5, -1)$ divided by the y-axis. Is the division internal or external?

iii) Two vertices of a triangle are $(-1, 4)$ and $(5, 2)$. If the Centroid of a triangle is $(5, 4)$. Find the third vertex.

iv) Find the values of x for the function $f(x) = x^3 - 75x + 10$
a) decreasing b) increasing

v) Find the total revenue for the function if the marginal revenue $MR = 5 - 3x^2 - 4x^3$.

Q 3) Attempt the following questions.

5X4=20

a) If $A = (2, 2), B = (-2, 4)$ and $C = (2, 6)$ are the vertices of a triangle ABC. Prove that ABC is an isosceles triangle by using distance formula.

- b) Find the equation of a line passing through the points $A = (2, 4)$ and $B = (5, 1)$
- c) If the marginal cost for a product $MC = 15x^2 + 6x + 4$ and the fixed cost is Rs. 200. Find the total cost and the average cost function.
- d) Find the extreme values of the function $f(x) = 2x^3 - 15x^2 + 36x + 5$ and also state the extreme values at the corresponding points.
- e) Find the equation of the line having y- intercept 3 and parallel to line $3x - 2y = -4$

OR

5X4=20

Q III) Attempt the following questions.

- i) Evaluate $\int (x - 2)(x + 7) dx$
- ii) Evaluate the limit $\lim_{x \rightarrow 3} \frac{x^2 - 9}{x - 3}$
- iii) Examine the continuity of a function at $x=3$
- $$f(x) = \begin{cases} x^2 + 1 & 0 \leq x < 3 \\ 4 & x = 3 \\ 2x - 3 & 3 < x \leq 6 \end{cases}$$
- iv) Find the value of $\int (10e^x - \frac{7}{x^2} + 6x + 5) dx$
- v) The midpoint of a line segment $(2a, 4)$ and $(-2, 2b)$ is $(1, 2a+1)$. Find the value of a and b.

Q 4) Attempt the following questions.

5X4=20

- a) Find the equation of a line passing through the point $(1, 3)$ making an intercept of 5 on the y-axis.
- b) Evaluate the following limit $\lim_{x \rightarrow 3} \frac{\sqrt{x+6} - 3}{x^2 - 9}$
- c) If $(a, 1)$, $(2, -3)$ and $(1, -5)$ are collinear points. Find the value of a?
- d) Find the equilibrium point and equilibrium price when $D = 49 - 4p$ and $S = 9p - 42$. Also state the demand and supply at that point.
- e) If $Z = x^4 + y^4 + x^3 y$, Verify that $x \frac{\partial Z}{\partial x} + y \frac{\partial Z}{\partial y} = 4Z$

OR

Q IV) Attempt the following questions.

5X4=20

- i) If the marginal demand and marginal supply function for a certain commodity is given by $MD = 3p^2 - 6p$, $MS = 15 - 2p$. Assuming that $p=0$ when demand and supply are zero. Find Demand and supply at $p = 4$ and $p = 5$.
- ii) Find the derivative of $y = x^{3/2} + 4^x - 3\log x + 55$ w.r.t x .
- iii) The supply function for a commodity is $p = x^2 + 5x + 4$, Find the producer surplus when $p = 10$.
- iv) Integrate the following $\int e^{3x+2} dx$
- v) Solve the following linear programming problem by graphical method.
- $$\begin{aligned} \text{Max } z &= 3x + 5y \\ \text{s.t } \quad x + 2y &\leq 20 \\ \quad \quad x + y &\leq 15 \\ \quad \quad y &\leq 6 \\ \\ x &\geq 0 \text{ and } y \geq 0 \end{aligned}$$