

SARASWAT VIDYALAYA'S
SRIDORA CACULO COLLEGE OF COMMERCE & MANAGEMENT STUDIES
KHORLIM, MAPUSA, GOA

B.Com – Honors / B.Com - General (w. e. f. 2017-18)

F.Y.B.COM. SEMESTER END EXAMINATION, JUNE '22
REGULAR SEMESTER II

Subject:- COMMERCIAL ARITHMETIC – II (CC-08, Course Code: UCAC102)
(CBCS – Revised Course)

M.Marks:- 80

Duration:- 2 hrs.

Instructions:- 1. Attempt both the questions.

2. Attempt each question on a new page and sub-questions together.

3. Internal choice is available.

4. Figures to the right indicate full marks.

Q.1. Attempt the following:

(5x4 = 20)

a) Show that the points (3, -5), (4, 3) and (11, -4) are the vertices of an isosceles triangle.

b) If $f(x) = (x - 1)(x - 2)(x - 3)$ $-2 \leq x < 2$
Find $f(1.5)$, $f(2)$ if they exist. Also find x if $f(x) = 0$.

c) Evaluate the following limits:

i) $\lim_{x \rightarrow 2} \frac{2x^2 - 8}{x - 2}$

ii) $\lim_{x \rightarrow 2} \frac{1}{x^2 + x - 6} + \frac{1}{x^2 - 9x + 14}$

d) Differentiate the following w.r.t. x (any two)

i) $2^x + x^2 + \frac{1}{2}x^2 - \sqrt{x} - \sqrt{2} + 2$ ii) $(x - 4)(x + 1)$ iii) $\frac{1}{4} * 4^x$

.OR.

Q.I. Attempt the following:

(5x4 = 20)

w) Find a point on the X-axis whose distance from the point (7, 5) is 13 unit.

x) Find the domain and range of f where

$f(x) = 6x + 3$ $0 \leq x \leq 6$.

y) Evaluate the following limits:

i) $\lim_{x \rightarrow 2} \frac{1}{x - 2} - \frac{2}{x^2 - 2x}$ ii) $\lim_{x \rightarrow 2} \frac{x^2 - 4}{x^2 - x - 2}$

z) Find the second order derivative of $y = 2e^{x+2}$

Q.2. Attempt the following:

(5x4 = 20)

- a) The cost of manufacturing x toys is given by $C = x^2 + 5x + 15$. Find the cost C , average cost and Marginal cost when 10 toys are manufactured.
- b) Show that the points (1, 2), (-3, 10) and (4,-4) are collinear.
- c) Integrate the following w.r.t. x
i) $x^2 + x - e^x + 3^x - 12$ ii) $(x + 1)(x + 8)$
- d) If $U = x^3 + y^3 - 4xy^2$, show that $x \frac{\partial U}{\partial x} + y \frac{\partial U}{\partial y} = 3U$

.OR.

Q.II. Attempt the following:

(5x4 = 20)

- w) The demand function for a commodity is given by $p = 20 - 2D^2$, find the total Revenue function, Marginal revenue function. Also find MR when $D = 2$.
- x) Let A(3, -2) and B(5, 4). Point B divides seg(AP) internally in the ratio 2:3. Find the co-ordinates of the point P.
- y) If $\int_{-1}^1 (3a x^2 + 2kx + 1) dx = 4$, find a.
- z) If $U = x^3 y + x y^3$, Show that $\frac{\partial^2 U}{\partial x \partial y} = \frac{\partial^2 U}{\partial y \partial x}$

Q.3. Attempt the following:

(5x4 = 20)

- a) If A(1, -2), B(-2, 3) and C(2, -5) are the vertices of a triangle ABC. Find the equation of Median (AM).
- b) If the demand function D is given by $D = 30 - 4p - 3p^2$, p being price, find the price elasticity of demand when price is 2 units.
- c) Discuss the continuity of the function at the point $x = 4$
$$f(x) = \begin{cases} \frac{x^2 - 16}{x - 4} & \text{if } x \neq 4 \\ 8 & \text{if } x = 4 \end{cases}$$
- d) The supply function for a commodity is $p = 3x^2 + 5$. Find the Producer's surplus when $p = 80$

.OR.

Q.III. Attempt the following:

(5x4 = 20)

- w) A line passes through (1, 3) and the sum of its intercepts on the axes is 8. Find its equation

x) Of the following two functions, find out which is a demand function and which is a supply function. Find the equilibrium price and the quantity demanded at that price:

$$x = 25 - 2p - \frac{p^2}{3} \qquad x = p + 13$$

y) Discuss the continuity of the function at the point $x = 3$

$$f(x) = \frac{2x^2 - 18}{x - 3} \qquad \text{if } x \neq 3$$

$$= -12 \qquad \text{if } x = 3$$

z) The demand curve of a commodity is $p=20 - 3D$ and the supply function is $p=2D$. Find the consumer's surplus under pure competition.

Q.4. Attempt the following: (5x4 = 20)

a) A company manufactures two types of bags: small bag (S) and big bag (B). The raw materials and labour available per day are 60 units and 50 hours respectively. S requires 2 units of raw material and 5 hours of labour whereas B requires 6 units of raw material and 2 hours of labour. It is observed that, however they try, the total number of bags produced per day, does not exceed 12. If the profit for small bag is Rs. 50/- and for big bag is Rs. 100/- Formulate the problem as a LPP.

b) The cost function of a certain firm is given by $C = 300x - 10x^2 + \frac{1}{3}x^3$ where x is the output. Find the output at which MC is Minimum.

c) The Marginal cost of a certain commodity is $MC = 3x^2 - 2x + 5$, with fixed cost as 16. Find its Total cost and Average cost when $x = 2$ units.

d) If $f(x) = x^2 - 5x + 6$, find $f(a)$, $f(k+1)$ and $f(x+3)$

.OR.

Q.IV. Attempt the following: (5x4 = 20)

w) Minimize $Z := 30x + 20y$,

$$\text{s/t } \begin{aligned} x + 2y &\geq 4 \\ 3x + 2y &\geq 6 \\ x \geq 0, \quad y &\geq 0 \end{aligned}$$

Feasible region is : ABC. Where $A = (0, 3)$, $B = (1, 1.5)$ and $C = (4, 0)$.

Find the solution

x) If the price of an item is $p = 20 - x$, find the total revenue function. Also find when it is maximum.

y) If the Marginal Revenue for a certain product is, $MR = 4x^3 + 6x^2 + 10x + 1$.
Find the Revenue function and the Average Revenue function when
 $x = 10$ units.

z) If $f(x) = \frac{5x+6}{4x-5}$, verify that $f(f(x)) = x$.

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