Roll. No. _____

Vidya Vikas Mandal's
Shree Damodar College of Commerce & Economics, Margao-Goa
FY B.Com, Semester-II, Semester End Examination April 2023
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) The ages of A and B are in the ratio of 9: 4. Seven years hence, the ratio of their ages will be 5:3. Find their ages .

e) The demand law is given as P= 15- 2D - D^2 .Find the consumers surplus when the demand is 2.

OR

Q I) 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 + 0.02 x + 0.0001 x^2.
Find a) average cost b) marginal cost at x= 10

iii) Evaluate the integral $\int (x^3 + 3x^2 - 2x + 5) dx$

iv) A person bought a book for Rs.360. For what price should he sell it to gain 15%.

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).

Q 2) Attempt the following questions. **5X4=20**

a) Solve the linear programming problem by graphical method

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

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) A purchase paid Rs. 7,80,000 on a car which costs Rs. 8,00,000 .Find the rate percent of discount.

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) On a certain day, 25% of boys were absent and 30 boys were present. Find the number of boys enrolled in that class.

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 = 15 x^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) = 2 x^3 - 15 x^2 + 36 x + 5 and also state the extreme values at the corresponding points.

e) The total profit of Rs.3600 is to be distributed among A,B and C such that A: B = 5:4, B:C = 8: 9 Find the profit of C. ?

OR

Q III) Attempt the following questions. **5X4=20**

i) The income of A and B are in the ratio 4:3 and their expenditure are in the ratio 2:1 .If each one save Rs. 1000, find their annual income .

ii) Evaluate the limit $\lim_{x \to 3} \frac{x^2-9}{x-3}$

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 $\int (10\, e^x - \frac{7}{x^2} + 6x + 5)\, dx$

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) My house is assessed for Rs.1800 .I have to pay 20% as a house tax and 14% as water tax . How much do I pay ?

c) A person was drawing a salary of Rs 6000 per month .He got 25% of rise in his salary. One year later, his salary was reduced by 10% by way of deduction from his loan . Find his new salary .

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) The selling price of 20 articles is equal to the cost rice of 25 articles . Find the gain or loss percent.

v) Solve the following linear programming problem by graphical method.

Max $z = 3x + 5y$

s.t $x + 2y \leq 20$

$x + y \leq 15$

$y \leq 6$

$x \geq 0$ and $y \geq 0$