

**CARMEL COLLEGE OF ARTS, SCIENCE & COMMERCE FOR WOMEN,
NUVEM-GOA
SEMESTER END EXAMINATION, APRIL-MAY 2023**

Sem. II of BCOM Mathematics

Class & Div.: FY BCOM (A&B)

Course Title & Code: Commercial Arithmetic II (UCAC102)

Maximum marks: 80

Date: 06/05/2023

Duration: 2 hrs

Total No of pages: 3

Instructions: i) All questions are compulsory.

ii) Figures to the right indicate the maximum marks.

iii) Non-programmable calculators are allowed.

I. Answer any 4 of the following. (4x4 = 16 marks)

- a. Obtain the equation of a line that passes through (4,3) and (1,1).
- b. Find the coordinates of the point that divides the line segment joining $A \equiv (2, -3)$ and $B \equiv (5, 6)$ in the ratio 2:1 internally.
- c. Find the slopes of the following lines.
 - i. $4x + 3y = 1$
 - ii. $x = -2y$
- d. The ages of Krillin and Tien are in the ratio 5:7 and the difference between their ages is 12 years. Find their present ages.
- e. Genos purchased a book for ₹1250 and sold it for ₹1100. Find his loss percent.
- f. Deviprasad bought fish worth ₹360. For what price should he sell it to gain 15%?

II. Answer any 4 of the following. (4x4 = 16 marks)

- a. Find $\frac{dy}{dx}$ if
 - i. $y = 3x^3 - 41x$
 - ii. $y = 3 \log(x)$
- b. Find $\frac{dy}{dx}$ if $y = \frac{x^2+1}{x+2}$
- c. Differentiate the following function with respect to x.
 $y = (x+2)(x^2+4)$
- d. Differentiate the following function with respect to x.
 $y = (4 \log(x) + 5)^{20}$

e. Evaluate $\int (x^4 + 4x^3 - 15x^2 + x - 6) dx$

f. Evaluate $\int_0^2 (x^2 + 4x) dx$

III. Answer the following.

(2x6 = 12 marks)

A. Solve the following Linear Programming Problem.

Minimise $z = 5x + 10y$; subject to

$$5x + 8y \leq 40$$

$$3x + y \leq 12$$

$$x \geq 0, y \geq 0$$

B. Find the equation of the line that is

i. Perpendicular to $x + 2y = 1$ and

ii. Passing through the intersection of the lines $x + y = 0$ and $2x + y = 3$

OR

III. Answer the following.

(2x6 = 12 marks)

X. Solve the following Linear Programming problem.

Maximize $z = 2x + 3y$, subject to

$$x + y \leq 2$$

$$3x + y \leq 4$$

$$x \geq 0, y \geq 0$$

Y. Show that $(-1, 2)$, $(3, -1)$, $(2, 6)$ are the vertices of a right-angled triangle.

IV. Answer the following.

(2x6 = 12 marks)

A. Find $f \circ g(x)$ and $g \circ f(x)$ if $f(x) = 3x - 1$ and $g(x) = x^2 + 1$

B. A dealer purchased a transistor for ₹202.50. At what price should it be sold so that a profit of 10.5% on the purchase may be earned after allowing 15% discount.

OR

IV. Answer the following.

(2x6 = 12 marks)

X. If $f(x) = x^2 + x + 1$; $0 \leq x \leq 2$
 $= 3x - 4$; $2 < x \leq 4$
 $= x^2 + 1$; $4 < x \leq 6$

Find $f(0)$, $f(2)$, $f(3.2)$, $f(5)$ and $f(6)$.

Y. At what price must an article costing ₹752 be marked so that a profit of 25% may be realised after allowing the customer a discount of 6%?

V. Answer the following. (2x6 = 12 marks)

A. If the total cost function is given by $C = 4x^2 + 7x + 3$, find the average cost and marginal cost when $x = 4$.

B. Discuss the continuity of the following function at $x = 4$

$$f(x) = \begin{cases} \frac{x^2 - 16}{x - 4} & 0 \leq x \leq 4 \\ 3x - 4 & 4 < x < 8 \end{cases}$$

OR

V. Answer the following. (2x6 = 12 marks)

X. The average cost of a commodity is given by $AC = 3x^2 - 12x + 90$ where x denotes the quantity produced. Find the quantity for which the average cost is minimum. Also find the minimum average cost.

Y. Evaluate the following limit.

$$\lim_{x \rightarrow 3} \frac{x^3 - 4x + 3}{x^2 - 9}$$

VI. Answer the following. (2x6 = 12 marks)

A. The marginal cost of a certain commodity is $MC = 3x^2 - 2x + 5$ with fixed cost as 16. Find the total cost and average cost when $x = 2$.

B. Find the partial derivative up to order 2 for the following function.

$$f(x, y) = x^2y + xy^2 - 4x - 5y + 1$$

OR

VI. Answer the following. (2x6 = 12 marks)

X. The supply function for a certain commodity is $p = 3x^2 + 5$. Find the producer's surplus at $x = 5$

Y. For the cost function $C(x, y) = 3x^2 + 2xy + y^2 + 10$, for two commodities X and Y , find Marginal Costs at $x = 1$ and $y = 5$.