

**CARMEL COLLEGE OF ARTS, SCIENCE & COMMERCE FOR WOMEN,
NUVEM-GOA**

SEMESTER END EXAMINATION, JUNE 2022

Semester:II OF BCOM

Course Title: Commercial Arithmetic - II Course Code: UCAC 102

Total marks:80 Date:13.06.2022 Duration:2 hours Total No of pages: 03

Instructions: i) All questions are compulsory
ii) Figures to the right indicate full marks
iii) Use of non programmable calculators is allowed.

I. Answer any four of the following.

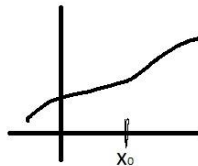
(4x4 = 16)

1. Find the slopes of the following lines
 - i. $2x + 3y = 4$
 - ii. line passing through (1,2) and (5,7)
2. Find the point which divides the line segment joining the points $A = (1,4)$ and $B = (4,7)$ in the ratio 1:2 internally.
3. Which of the following relations from $A = \{1,2,3,4,5\}$ to $B = \{a, b, c, d\}$ are functions? Justify your answers.
 - i. $R = \{(2, a), (3, b), (4, c), (1, d)\}$
 - ii. $R = \{(2, a), (3, c), (4, a), (3, d), (5, b)\}$
4. Check whether the following lines are parallel or perpendicular to the line $3x + 2y = 7$.
 - i. $4x - 6y = 2$
 - ii. $12x + 8y = 0$
5. Evaluate $\lim_{x \rightarrow 2} \frac{x^2 - 4}{x - 2}$.
6. Examine the continuity of the function $f(x) = \begin{cases} x^2 + 2x + 4; & \text{when } x \neq 0 \\ 1 & ; \text{when } x = 0 \end{cases}$

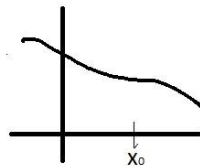
II. Answer any four of the following.

(4x4 = 16)

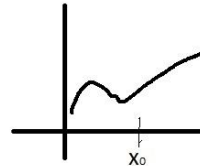
1. Differentiate the following functions.
 - i. $f(x) = 3x^7$
 - ii. $f(x) = \log(e^x)$
2. Find $f'(4)$ for the following functions.
 - i. $f(x) = e^x x^3$
 - ii. $f(x) = 5^x$
3. For which of the following functions is the derivative at x_0 positive? Justify your answers.



(a)



(b)



(c)

4. Find $\frac{\partial f}{\partial x}$ and $\frac{\partial f}{\partial y}$ where $f(x, y) = x^2 + 2xy + y^2$.
5. Evaluate the following integrals.
 - i. $\int e^{3x-5} dx$
 - ii. $\int \frac{x^4 + 2x + 1}{x^2} dx$
6. Find $\int_1^4 2x^3 + 3^x dx$

III. Answer A and B OR X and Y.**(2x6 = 12)**

A. Discuss the continuity of the following function.

$$f(x) = \begin{cases} \frac{x^2 - 4x + 3}{x^2 - 1} & \text{when } 0 \leq x \leq 1 \\ \frac{x^2 - 3x + 2}{x - 1} & \text{when } 1 < x \leq 4 \\ 4x^2 + 2 & \text{when } 4 < x \leq 11 \end{cases}$$

B. Evaluate the following limits.

i. $\lim_{x \rightarrow 5} \left(\frac{1}{x-5} - \frac{5}{x^2-5x} \right)$

ii. $\lim_{x \rightarrow 0} \frac{\sqrt{2+x} - \sqrt{2-x}}{x}$

OR

X. Find the range of the following functions.

i. $f(x) = -3x + 2, \quad -12 \leq x \leq -4$

ii. $f(x) = -x^2 + 3, \quad -5 \leq x \leq 4$

Y. Find f_{xy} and f_{yx} for the following function.

$$f(x, y) = \frac{x^4 + 3xy + y^2}{x^2}$$

IV. Answer A and B OR X and Y.**(2x6 = 12)**

A. Solve the following Linear Programming Problem.

Maximize $z = 3x - 2y$

Subject to

$$2x + 3y \leq 12$$

$$x + 2y \leq 4$$

$$x \leq 5$$

$$x, y \geq 0$$

B. Find the equation of the line which is

i. perpendicular to the line $3x + 2y = 7$

ii. and passes through the point which divides the segment joining $A = (0, 3)$ and $(3, 9)$ in the ratio 1: 2 internally.

ORX. Find the 3rd derivative of the function $f(x) = \log(x) e^x - \log(x^{14})$

Y. Find the derivative of the following function.

$$f(x) = \frac{e^{\log(x)} 21^x}{1 + e^{x^2} - x^4}$$

V. Answer A and B OR X and Y.**(2x6 = 12)**

A. Evaluate the following integrals.

i. $\int \frac{1}{x\sqrt{x}} dx$

ii. $\int \frac{x^3 + 9x^2 + 14x}{x(x+7)} dx$

B. The demand function p in terms of quantity demanded (D) is given by

$$p(D) = D^2(\log(D) - 4). \text{ Find}$$

i. Total Revenue

ii. Average revenue

iii. Marginal Revenue when the demand is 4 units

OR (PTO)

OR

X. Evaluate the following integrals.

i. $\int \frac{9x-5+\sqrt{9x-5}+6}{\sqrt{9x-5}} dx$

ii. $\int \frac{e^{2x+1}}{e^x} dx$

Y. The cost of manufacturing x toys is given by $C(x) = \log(x^4 e^x)$, where x denotes the number of toys manufactured. Find

i. Total cost when $x = 10$

ii. Average cost when $x = 10$

iii. Marginal Cost when $x = 10$

VI. Answer A and B OR X and Y.

(2x6 = 12)

A. The Marginal Cost of a certain commodity is given by

$$MC(x) = \frac{3x^2 - 2x^3 + 5x}{x}$$

Find the total cost and average cost when $x = 2$ if the fixed cost is 16.

B. Find the extreme values of the function $f(x) = 2x^3 - 15x^2 + 36x + 5$

OR

X. Find the value of x such that the point $(1, x)$ is at a distance of $\sqrt{3}$ units from $(3, -2)$.

Y. Obtain the relation R from $A = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$ to

$B = \{2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24\}$ where aRb if

i. $b = 2a$.

ii. $b \leq 2a$
