

## FYBCOM Semester End Assessment (Regular/Repeat)

April, 2023

Course Title: COMMERCIAL ARITHMETIC - II

Course Code: UCAC102

Category: Core Course

Semester: II

Duration: 2 hrs

Max Marks: 80

**Instructions:**

1. The question paper contains 4 questions spread across 2 pages.
2. All questions are compulsory however internal choice is available.
3. You may answer randomly but every main question attempted should be answered serially.
4. Figures to the right in brackets indicate maximum marks.
5. Use of calculator is strictly forbidden.

**Q1. Attempt the following.**

(4 x 5 = 20)

- a. Show that (3, 3), (9, 0) and (12, 21) are the vertices of a right angled triangle.
- b.  $f(x) = x^2 - 4x + 7$  ;  $0 \leq x \leq 4$ . Find  $f(1)$ ,  $f(2)$ ,  $f(3)$  and  $f(5)$  if they exist.
- c. Integrate the following functions w.r.t x: (i)  $f(x) = (x-2)(x+5)$  (ii)  $f(x) = \frac{3x^5 - 4x + 5}{x^3}$
- d. Two numbers are in the ratio 6:5. If 5 is added to both the numbers, the ratio becomes 7:6. Find the numbers.

**OR****Q1. Attempt the following.**

(4 x 5 = 20)

- p. Find the co-ordinates of point P which divides the line segment AB in the ratio 3 : 5, where A = (4, -3), B = (6, 1).
- q. If  $f(x) = \frac{x-2}{x+2}$ . Find  $f(-1)$ ,  $f(0)$  and  $f(2)$ .
- r. Evaluate: (i)  $\int (2x + 1)^2 dx$  (ii)  $\int (4x^3 - 7e^x + x^{-5}) dx$
- s. In a college having 405 students, the ratio between the number of boys and girls is 7 : 2. Find the number of boys and girls.

**Q2. Attempt the following.**

(4 x 5 = 20)

- a. The mid-point of the line segment joining the points (3m, 6) and (-4, 3p) is (1, 2m - 1). Find the values of m and p.
- b. Evaluate  $\lim_{x \rightarrow 1} \left( \frac{3x^2 - 5x + 2}{x^2 - 1} \right)$ .
- c. Find  $\int_1^3 (x^2 + x + 1)(2x - 5) dx$
- d. A father is four times as old as his son today. After 20 years, he would be as twice as old as his son. How old is the father.

**OR****QII. Attempt the following.**

(4 x 5 = 20)

- p. Show that the points (3, -3), (5, 8), (4, 7) and (2, -4) are the vertices of a parallelogram.
- q. Evaluate  $\lim_{x \rightarrow 2} \left( \frac{x^2 - 2x}{x^3 - 5x^2 + 7x - 2} \right)$ .
- r. Evaluate  $\int_0^5 \frac{x^2 - 5x + 6}{x - 3} dx$

- s. If 10 people, working 8 hours a day, can complete a task in 24 days, how many people working 10 hours a day would be required to complete the same tasks in 16 days?

**Q3. Attempt the following.**

(4 x 5 = 20)

- a. Find the equation of a line passing through the point (5, 3) and perpendicular to the line  $2x + 4y - 1 = 0$ .
- b. Check the continuity of the function at  $x = 3$  where  $f(x) = \begin{cases} x^2 + 1 & x < 3 \\ 10 & x = 3 \\ 2x + 4 & x > 3 \end{cases}$
- c. Find  $\frac{dy}{dx}$  for (i)  $y = (x^2 + 1)(x - 3)$  (ii)  $y = 5x^2 \log(x)$
- d. Find the following: (i) 15% of 1km and 500 m (ii) the number whose 12% is 9.

OR

**QIII. Attempt the following.**

(4 x 5 = 20)

- p. Find the equation of a line which has y-intercept as 4 and is parallel to  $4x + 3y + 7 = 0$ .
- q. Examine the continuity of function  $f(x)$  at  $x = 4$ , where  $f(x) = \begin{cases} \frac{x^2 - 16}{x^2 + x - 20} & x \neq 4 \\ \frac{8}{9} & x = 4 \end{cases}$
- r. Differentiate with respect to x: (i)  $y = 5x^6 + \sqrt[3]{x} - 7e^x + 12$  (ii)  $y = x^{-4} + 5x^4 - 7^x$
- s. The listed price of an article is Rs. 5400. If discount of 20% is allowed to the buyer, how much will the buyer pay?

**Q4. Attempt the following.**

(4 x 5 = 20)

- a. A chemist has a compound to be made using three basic elements A, B and C, so that it has at least 10 litres of A, 15 litres of B and 16 litres of C. he makes this compound by mixing two compounds,  $M_1$  and  $M_2$ . Each unit of compound  $M_1$  has 2 litres of A, 3 litres of B and 4 litres of C, whereas each unit of compound  $M_2$  has 1 litre of A, 2 litres of B and no C. the unit cost of the compounds  $M_1$  and  $M_2$  are ₹ 350 and ₹ 600 respectively. Formulate a LPP to minimize the cost.
- b. Find second order derivative of the function  $f(x) = 5x^{-3} + 2e^x + 7 \log(x) - 9$
- c. The total cost for daily production is  $C = 40 + 10x - x^2$ . Find the average cost and marginal cost at  $x = 3$ .
- d. The marginal cost of production is  $MC = 200 - 40x + 3x^2$ , where x is the number of units produced. The fixed cost of production is ₹ 800. Find the cost function.

OR

**QIV. Attempt the following.**

(4 x 5 = 20)

- p. Maximize  $z = x + 4y$ , subject to the constraints  $x + 2y \leq 8$  and  $3x + 2y \leq 12$ ; where  $x, y \geq 0$
- q. If  $y = \frac{3x^{-6} + x^4 - 7}{x^2}$ , find  $\frac{d^2y}{dx^2}$ .
- r. If the demand function is given by  $D = 3 + 4p - p^2$ , where p is price, then find demand when price is 4 and marginal demand when price is 1.
- s. Find  $\frac{\partial z}{\partial x}$  and  $\frac{\partial z}{\partial y}$  if  $z = x^2 - 4xy + y^4$ .

\*\*\*\*\* All The Best \*\*\*\*\*

