

LOYOLA-INTERNATIONAL ACADEMIC COLLABORATION

LOYOLA COLLEGE CHENNAI – 600 034

BBA-FRANCE – END SEMESTER EXAMINATION

FIRST SEMESTER – APRIL 2023

BBA 134 – BUSINESS MATHEMATICS I



Date : 02-05-2023

Dept. No.

Max. : 100 Marks

Time : 01:00 PM - 04:00 PM

Section - A

I. Answer the following

4 X 5 = 20

- Find the 15th term from the end of the sequence 7,10,13, 130
- The marginal cost and marginal revenue with respect to a commodity of a firm are given by $C'(x) = 4 + 0.08x$ and $R'(x) = 12$. Find the total profit, given that the total cost at zero output is zero.
- Discuss the continuity of the function given below at various breaking points

$$\text{A function } f \text{ is defined on by } f(x) = \begin{cases} -x^2 & \text{if } x \leq 0 \\ 5x - 4 & \text{if } 0 < x \leq 1 \\ 4x^2 - 3x & \text{if } 1 < x < 2 \\ 3x + 4 & \text{if } x \geq 2 \end{cases}$$

- Mr. John sells two items for Rs.4800 each. In one deal he earns a profit of 25% and in the other he suffers a loss of 20%. Find the profit or loss percentage in the whole deal.

Section – B

II. Answer any four of the following

4 X 10 = 40

- The sum of an infinite G.P is 'S' and the sum of the squares of its terms is 's'. Show that the first term and the common ratio are respectively
 $a = 2S.s/(S^2 + s)$ and $r = (S^2 - s)/(S^2 + s)$
- Faced with two distinct demand functions $Q_1 = 24 - 0.2P_1$ and $Q_2 = 10 - 0.05P_2$ where $TC = 35 + 40Q$, what price will the firm charge (a) with discrimination between markets and (b) without discrimination between the markets?
- The demand and supply functions under perfect competition are $P_d = 1600 - x^2$ and $P_s = 2x^2 + 400$ respectively. Find the consumer's surplus and producer's surplus.
- Prove by Mathematical induction that $(a^n - b^n)$ is divisible by $(a-b)$ for all $n \in \mathbb{N}$
- The demand 'x' (in Kg) for a commodity when its price is p (in Rs.) is given by $p = 108 - 3x/5$. Find the elasticity of demand when the price is Rs.12.

Section - C

III. Answer any two of the following

2 X 20 = 40.

10. A firm has a branch store in each of the three cities 'A', 'B' and 'C'. 'A' and 'B' are 320 km apart and 'C' is 200 km from each of them. A godown has to be built equidistant from 'A' and 'B'. In order to minimize the time of transportation, it should be located so that the sum of the distances from the godown to each of the cities is minimum. Where should the godown be built?
11. (a) The elasticity of demand with respect to price for a commodity is a constant and is equal to 2. Find the demand function and hence the total revenue function, given that, when the price is 1, the demand is 4.
(b) Given that $z(x, y) = 3x^3 - 5y^2 - 225x + 70y + 23$, (i) find the critical points at which the function may be optimized and (ii) determine whether at these points the function is maximized, is minimized, is at an inflection point, or is at a saddle point.
12. (a) A firm finds that it can sell all that it produced (within limits). The demand function is $p = 260 - 3x$, where p is the price per unit at which it can sell x units. The cost function is $c = 500 + 20x$, where x is the number of units produced. Find x so that profit is maximum.
(b) Marginal revenue function of a firm is $ab/(x - b)^2 - c$. Prove that the demand law is $p = a/(b - x) - c$
