LOYOLA-INTERNATIONAL ACADEMIC COLLABORATION
LOYOLA COLLEGE CHENNAI – 600 034

BBA-FRANCE – END SEMESTER EXAMINATION

FIRST SEMESTER – NOVEMBER 2019

BBA 134 – BUSINESS MATHEMATICS I

Date: 29/10/2019   Dept. No.   Max. : 100 Marks
Time: 9 A.M. – 12 P.M.

Section - A

Answer _any five_ of the following   **5 X 4 = 20**

1. Differentiate $\{\log(\log(\log x))\}^n$
2. Integrate $e^x (\tan x + \log \sec x)\, dx$
3. Prove that $2^{4n} - 1$ is divisible by 15 by the Principle of Mathematical Induction
4. A trader purchases 100 units of an item at Rs.630 per unit. He sells 45 units at the rate of Rs.665 per unit, 35 units at the rate of Rs.650 per unit and the remaining at the rate of Rs.635 per unit. Find his total gain or loss in percentage.
5. The houses in a row are numbered consecutively from 1 to 49. Show that there exists a value of X such that the sum of the numbers of houses preceding the house numbered X is equal to sum of the numbers of houses following X.
6. If $e^x + e^y = e^{x+y}$, then prove that $dy/dx = -e^x(e^y – 1)/e^y(e^x – 1)$

Section - B

Answer _any four_ of the following   **4 X 10 = 40**

7. Discuss the continuity of the function given by $f(x) = |x – 1| + |x – 2|$ at $x = 1$ and $x = 2$
8. For the TC given below find the AC function, the critical value at which AC is minimized and the minimum Average Cost, where $TC = Q^3 – 5Q^2 + 60Q$
9. 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. Also find out the maximum revenue.
10. If '**S**' is the sum, '**P**' is the product, and 'R' is the sum of the reciprocals of n items in a G.P, prove that **$P^2R^n = S^n$**

       /3

11. $1/(1 + \cot x)\, dx$

       /6

12. Prove by Mathematical induction that $(a^n – b^n)$ is divisible by $(a–b)$ for all $n \in N$

Answer *any two* of the following   **2 X 20 = 40.**

13. (a) 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.

(b) A function 'f' is defined as

$$f(x) = \begin{cases} x^2 + ax + b , & 0 \le x < 2 \\ 3x + 2 , & 2 \le x \le 4 \\ 2ax + 5b , & 4 < x \le 8 \end{cases}$$

is continuous on [0,8]. Find the values of 'a' and 'b'

14. (a) The manufacturing cost of an article involves a fixed overhead of Rs.100 per day, Rs.0.50 for

material and $x^2/100$ per day for labour and machinery to produce 'x' articles. How many articles should

be produced per day to minimize the average cost per article?

(b) Find the equilibrium price and quantity for two related markets, beef(B) and pork(P) when

$Q_{dB} = 82 - 3P_B + P_P$; $Q_{sB} = -5 + 15P_B$;

$Q_{dP} = 92 + 2P_B - 4P_P$; $Q_{sP} = -6 + 32P_P$

15. (a) When transistors were priced at Rs.400 by a firm, 20 were sold per week. When price was reduced

to Rs.100, sales were 120 per week. The supply curve is $P = 2x$. Determine the consumer's surplus.

(b) If η_1 and η_2 are the price elasticities of demand for the demand laws $P_1 = e^{-x}$ and $P_2 = e^{-x} / x$, then

show that $\eta_1\eta_2 = \eta_1 - \eta_2$

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