

**END TERM EXAMINATION**

FIRST SEMESTER [BBA] NOV-DEC-2019

Paper Code: BBA-103

Subject: Business Mathematics

Time: 3 Hours

Maximum Marks: 75

Note: Attempt any Six questions.

- Q1 a) The third and thirteenth terms of an A.P are respectively equal to -40 and 0. Find the A.P and its 20<sup>th</sup> term. (6)  
 b) The sum of three numbers in a G. P is 38 and their product is 1728. Find them? (6.5)

- Q2 a) If  $A = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$  and  $B = \begin{bmatrix} 0 & 1 \\ -1 & 1 \end{bmatrix}$ , show that  $(aA+bB)(aA-bB) = (a^2+b^2)A$ . (6)  
 b) Solve the following system of equations using Cramer's Rule  
 $5x-7y+z=11$   
 $6x-8y-z=15$   
 $3x+2y-6z=7$ . (6.5)

- Q3 a) For the following transaction matrix, find the gross output for each industry for the final demand 18 and 44 units respectively (6.5)

Industry	Input to		Final demand
	I	II	
I	16	20	4
II	8	40	32

- b) Differentiate with respect to x (2+2+2)  
 i)  $e^{3x}(\log x) \cdot \sin x$ . (ii)  $(\sin x)^{\log x} + (\log x)^{\cos x}$ .

- Q4 a) Check for maxima or minima for the function  $Z = 4x^2 - xy + y^2 - x^3$ . (6.5)  
 b) Find the intervals on which the following function is increasing or decreasing  $f(x) = x^4 - 8x^3 + 22x^2 - 24x + 1$ . (6)

- Q5 a) If  $x = t \log t$  and  $y = \frac{\log t}{t}$ , find  $\frac{dy}{dx}$  at  $t=1$ . (6)  
 b) Differentiate  $\sin x$  with respect to  $\log x$ . (6.5)

- Q6 Find (4+4+4.5)

i)  $\int \frac{dx}{(e^x - 1)^2}$  (ii)  $\int \frac{x^2 + 1}{x^4 + 1} dx$  (iii)  $\int_0^{\pi/2} \frac{dx}{4 + 5 \sin x}$

- Q7 a) If the total cost function for a commodity is given by  $C(x) = \frac{1}{3}x^3 + 3x^2 - 7x + 16$ , where  $x$  is the quantity of output, show that  $\frac{d}{dx}(AC) = \frac{1}{x}(MC - AC)$ . (6)

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BBA-103  
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- b) Suppose that marginal cost of a product is given by  $25+30x-9x^2$  and fixed cost is proven to be 55. Find the total cost and average cost functions. (6.5)

- Q8 A firm has the following total revenue and total cost functions  
 $TR=100x-x^2$ ,  $TC= x^3 - \frac{57}{2}x^2$ , where  $x$  is the output. Find maximum profit. (12.5)

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