

# END TERM EXAMINATION

FIRST SEMESTER [BBA] DECEMBER 2024

Paper Code: BBA-103/BBA(CAM)103

Subject: Business Mathematics

Time: 03:00 Hours

Maximum Marks: 60

Note: Attempt any five questions in all including Q.No1 which is compulsory.  
Internal Choice is indicated.

Q1 Attempt any Four of the following questions:

(4x5=20)

- (a) Find the number of distinct permutations of the letters of the word MATHEMATICS?
- (b) From 7 gents principals and 4 ladies principals a committee of 5 is to be formed. In how many ways can this be done so as to include at least one lady principal?
- (c) The supply function of a producer is given by  $p = 0.4e^{2x}$ , where  $x$  denotes thousand units. Find producer surplus when sales are 2000 units.
- (d) Find the sum of all natural numbers between 250 and 1000, which are exactly divisible by 3.
- (e) The demand law for a commodity is given by  $p = 20 - 2x - x^2$ . Find the consumer's surplus when the market demand is 3.
- (f) Find the absolute maximum and minimum values of the function  $f(x) = 3x^4 - 2x^3 - 6x^2 + 6x + 1$  in the interval  $[0, 2]$ .
- (g) Find the number of ways in which a cricket team consisting of 11 players can be selected from 12 players. Also, find how many of these ways (i) include the captain (ii) do not include the captain.
- (h) Find five numbers in AP such that their sum is 35 and the sum of their squares is 285.

Q2 Show that the matrix  $A = \begin{pmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{pmatrix}$  satisfies the equation

$$A^3 - 6A^2 + 9A - 4I = O \text{ and hence deduce } A^{-1} \quad (10)$$

OR

Q3 Use the principle of mathematical induction to prove that

$$1^3 + 2^3 + 3^3 + \dots + n^3 = \left(\frac{n(n+1)}{2}\right)^2 \quad (10)$$

Q4 For the following transaction matrix, find the gross output for each industry for the final demands 18 and 44 units respectively. (10)

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

OR

P-1/2

P.T.O.

Q5 The total cost  $C(x)$  of a firm is:  $C(x) = 1500 + 30x + x^2$ , where  $x$  is the output. Determine: (10)

- (i) The Average Cost
- (ii) The Marginal Cost
- (iii) The Marginal Cost when 20 units are produced
- (iv) The actual cost of producing twenty first unit

Q6 Solve the following system of linear equations using Gauss Jordan Elimination method: (10)

$$X + 2y + 3z = 1$$

$$X + 3y + 5z = 2$$

$$2x + 5y + 9z = 3$$

OR

Q7 (i) If  $y = \sqrt{u}$  and  $u = 5 + 7x + x^3$ , find  $dy/dx$ .

(ii) Find  $dy/dx$  if  $x = (1-t)/(1+t)$  and  $y = 2t^3 + 4t$  (10)

Q8 After producing 35 units, a company determines that its production facility is following a learning curve of the form  $f(x) = 1000x^{-1/2}$ , where  $f(x)$  is the number of hours of direct labour required to produce the  $x$ th unit. How many total labour-hours should they estimate are required to produce an additional 25 units? (10)

OR

Q9 (i)  $\int x \log x \, dx$

(ii) Find the area of the region bounded by the curves  $y = x^2$  and  $y = x$ . (10)

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