(Please write your Exam Roll No.)

END TERM EXAMINATION

FIRST SEMESTER [BBA] JANUARY 2024

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

Subject: Business Mathematics

Time: 3 Hours

Maximum Marks: 60

Note: Attempt any five questions.

Q1 a) Use the principle of mathematical induction to prove that $1^3 + 2^3 + 3^3 + \ldots\ldots + n^3 = (\frac{n(n+1)}{2})^2$ **(6)**

b) Find the first term of an A.P. whose common difference is 3 and whose 7^{th} term is 11. **(6)**

Q2 a) A question paper contains ten questions divided into two groups of five questions each. In how many ways can an examinee answer six questions taking at least two questions from each group? **(6)**

b) How many words can be formed by the letters of the word 'EXAMINATION' taken all together? How many of them have no two vowels coming together? **(6)**

Q3 a) If $y = \sqrt{u}$ and $u = 5 + 7x + x^3$, find dy/dx. **(6)**

b) Find dy/dx when $x^3+y^3 = xy$. **(6)**

Q4 a) The total cost C(x) of a firm is: $C(x) = 1500 + 30x + x^2$, where x is the output. Determine: **(6)**

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

b) Find the absolute maximum and minimum values of the function $f(x) = 2x^2 - 8x+1$ in the closed interval [0,3]. **(6)**

Q5 a) Solve the following system of linear equations using Gauss Jordan Elimination method:

$X + 2y + 3z = 1$
$X + 3y + 5z = 2$
$2x + 5y + 9z = 3$ **(6)**

b) Show that the matrix $A = \begin{matrix} 5 & 3 & 1 \\ 2 & -1 & 2 \\ 4 & 1 & 3 \end{matrix}$ satisfies the equation $A^3 - 7A^2 - 5A + 13I = O$. Hence obtain A^{-1}. **(6)**

Q6 a) Find the consumer's surplus when market price p=4 and the demand function for a commodity is given by $p = 100 - 8x$. **(6)**

b) Find the area of the region bounded by the curve $y = x^2$, the x-axis and the lines x=2 and x=3. **(6)**

P.T.O.

Q7 a) Evaluate the following integrals

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

(ii) $\int \frac{\log x}{\sqrt{x}} \, dx$ **(6)**

b) If the marginal revenue is given by MR = 15 - 2x - x^2, then find the total revenue and the demand function. Also, find the maximum revenue. **(6)**

Q8 a) A firm has two machines M_1 and M_2 costing Rs 45,000 and Rs 30,000. Each has 5 years life with scrap value nil. Find depreciation of each machine for each year using matrix notation if both are depreciated by sum of the year's digit method **(6)**

b) Find the sum of all natural numbers between 250 and 1000, which are exactly divisible by 3 **(6)**

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