

Printed Pages : 4



BM-103

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 293108

Roll No.

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M. A. M.

(SEM. I) (ODD SEM.) THEORY
EXAMINATION, 2014-15
BUSINESS MATHEMATICS

Time : 3 Hours]

[Total Marks : 100

- Note:**
- (1) This paper is in three sections. There are total of seven questions in all the sections. Section A carries 20 Marks, Section B carries 30 Marks and Section C carries 50 Marks.
 - (2) Attempt all questions. Marks are indicated against each questions/parts.

SECTION - A

- 1 You are required to answer ALL the parts of this question : **2×10=20**
- (a) Determine the set of three digits for ${}^{10}P_3$.
 - (b) $\frac{{}^{n+3}P_6}{{}^{n+2}P_4} = 14$ then find value of n .
 - (c) What do you mean by closed input-output model?
 - (d) Explain homogeneous differential equation.

- (e) Evaluate $\int (x^a + a^x) dx$
- (f) State point of inflexion.
- (g) Find the matrix A such that $A \begin{bmatrix} 3 & 4 \\ 6 & 2 \end{bmatrix} = \begin{bmatrix} 2 & 8 \\ 9 & 4 \end{bmatrix}$
- (h) What do you mean by order and degree of a differential equation? Explain with the aid of an example.
- (i) What are the necessary and sufficient condition to maxima and minima?
- (j) Find the sum of n terms of
 $0.7 + 0.77 + 0.777 + \dots \dots \dots$

SECTION - B

2 Attempt any three parts of the following : **10×3=30**

- (a) If x, y, z are respectively the sum of p, q and r terms of an A.P., show that

$$\frac{x}{y}(q-r) + \frac{y}{q}(r-p) + \frac{z}{r}(p-q) = 0$$

- (b) Use Lagrange's method of undetermined multipliers to find the minimum value of $x^2 + y^2 + z^2$ subject to the conditions $x+y+z=1$, $xyz+1=0$.
- (c) If x and y satisfy the relation $ax^2 + by^2 = ab$, prove that the extreme values of the function $u = x^2 + xy + y^2$ are given by the roots of the equation $4(u-a)(u-b) = ab$.
- (d) An individual's preference scale for goods x and y is defined by the marginal rate of substitution of y for x as $\frac{x-a}{x-b}$. Show that $u = (x-a)^2 + (y-b)^2$ is the form of the utility function.
- (e) Describe the uses of Business Mathematics.

SECTION - C

- 3 Attempt any two parts of the following : **5×2=10**
- (a) A Pure Mathematics 30 class has 10 boys and 12 girls. The teacher wants to form a committee of 3 students to plan the year-end picnic. Determine the number of committees possible if
- (i) There are no restrictions
 - (ii) There are no boys on the committee
 - (iii) There must be at least one boy on the committee
- (b) Differentiate combination and permutation with suitable examples.
- (c) The sum of certain number of terms of an arithmetic progression 11, 9, 7, is 27. Find the number of terms and explain the double answer.
- 4 Attempt any two parts of the following : **5×2=10**
- (a) Find the minimum value of $x^2 + y^2 + z^2$, given that $ax + by + cz = p$.
- (b) Find the maximum and minimum distances from the origin to curve $x^2 + 4xy + 6y^2 = 140$.
- (c) Write a note on uses of matrices in business problems.
- 5 Attempt any two parts of the following : **5×2=10**
- (a) A population grows at the rate of 8% per year. How long does it take for the population to double? Use differential equation for it.
- (b) If $A = \begin{bmatrix} 1 & 2 & 1 \\ a & 0 & 4 \\ 1 & 1 & 1 \end{bmatrix}$ and $adj(adj A) = A$, find a .

- (c) A company produces three products every day. The total production on a certain day is 90kg. It is found that the production of the first product exceeds the production of the first second product by 20kg while the total production of the first and second products is twice the production of the third. Determine the level of output using matrix algebra.

6 Attempt any one part of the following : **10×1=10**

- (a) The following table gives Technology matrix for a two sector economy:

	Sector I	Sector II
Sector I	0.5	0.3
Sector II	0.3	0.2
Labour(day)	0.5	0.4

- (b) Solve $\frac{dy}{dx} + \left(\frac{x}{1-x^2} \right) y = x\sqrt{y}$

7 Attempt any two parts of the following : **5×2=10**

- (a) If the sums of m and n terms of an A.P are in ratio $m^2 : n^2$. Show that the ratio of m^{th} and n^{th} terms of that A.P. is $2m-1 : 2n-1$.
- (b) Divide 63 into parts which will be in G.P. and such that the sum of 1st and 3rd shall be $\frac{17}{4}$ times the second part.
- (c) Find the extreme values of function $x^3 + y^3 - 3axy$.