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# DMI-ST. EUGENE UNIVERSITY

ZAMBIA

DEGREE EXAMINATION – JUNE 2024

Semester: I

551/552 MA 12 BUSINESS MATHEMATICS

Time: 3:00 Hours

Max. Marks: 100

Answer any FIVE Questions (5 x 20 = 100 Marks)

1. a) If A, B and C are finite sets, then prove that **(10 Marks)**  
$$n(A \cup B \cup C) = n(A) + n(B) + n(C) - n(A \cap B) - n(B \cap C) - n(A \cap C) + n(A \cap B \cap C)$$
  
b) Solve  $\log_{5-x}(x^2 - 6x + 65) = 2$  **(10 Marks)**
2. a) Solve the following equation by substitution method. **(10 Marks)**  
$$x + y = 7$$
$$3x - 2y = 11$$
  
b) There is a hall whose length is five times the width. The area of the floor is 45m<sup>2</sup>. Find the length and width of the hall. **(10 Marks)**
3. a) In an A.P., sum of four consecutive terms is 28 and their sum of their squares is 276. Find the four numbers. **(10 Marks)**  
b) Find the middle term(s) of an A.P. 9, 15, 21, 27, ..., 183. **(10 Marks)**
4. a) Solve the equations  $2x + 3y = 7$ ,  $3x + 5y = 9$  by Cramer's rule. **(10 Marks)**  
b) If  $A = \begin{bmatrix} 4 & 6 & 2 \\ 0 & 1 & 5 \\ 0 & 3 & 2 \end{bmatrix}$  and  $B = \begin{bmatrix} 0 & 1 & -1 \\ 3 & -1 & 4 \\ -1 & 2 & 1 \end{bmatrix}$ , verify that  $(AB)^T = A^T B^T$ . **(10 Marks)**
5. a) K2,000 is invested at annual rate of interest of 10%. **(10 Marks)**  
What is the amount after 2 years if the compounding is done?  
(a) Annually?  
(b) Semi annually?

(c) Monthly?

(d) Daily?

b) Elaborate the term “Annuity” with suitable examples. **(10 Marks)**

6. a) The three sides of a right-angled triangle are  $x$ ,  $x + 1$  and 5. Find  $x$  and the area, if the longest side is 5. **(10 Marks)**

b) The product of Kumaran’s age (in years) two years ago and his age four years from now is one more than twice his present age. What is his present age? **(10 Marks)**

7. a) Give and explain types of ratios with examples. **(10 Marks)**

b) Explain annuities based on the mode of payment. **(10 Marks)**