



**TECHNICAL UNIVERSITY OF MOMBASA  
SCHOOL OF BUSINESS**

DEPARTMENT OF MANAGEMENT SCIENCE

UNIVERSITY EXAMINATIONS 2016/2017

FIRST YEAR FIRST SEMESTER EXAMINATIONS FOR BACHELOR OF  
COMMERCE

**BMS 4101: MANAGEMENT MATHEMATICS I**

END OF SEMESTER EXAMINATIONS

**SERIES: DECEMBER 2016**

**TIME: 2 HOURS**

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**INSTRUCTIONS:**

1. Answer Question **ONE (Compulsory)** and any other **TWO** questions.
2. Question one carries 30 marks
3. Other questions carry 20 marks each.
4. Marks will be awarded to students who demonstrate accuracy and clarity of presentation.
5. Calculators are allowed in the examination room

### QUESTION 1 (COMPULSORY)

- a) State the meaning of the following terms as used in economics. (10 marks)
- Venn diagram
  - Number line
  - Direct proportion
  - Binomial expansion
  - Pure quadratic equation
- b) Solve the following and plot the relevant number lines given  $x \in R$ .
- $-2x + 3 \leq x \leq 6 - x$  (5 marks)
  - $|x - 4| \geq 6$  (5 marks)
- c) A market has the following demand and supply functions.  $Q_d = P^2 - 100P + 2500$ ,  $Q_s = 0.5P^2 - 200$ . Where  $Q_d$  = Quantity demanded,  $Q_s$  = Quantity supplied and  $P$  = Price. Determine equilibrium price and quantity if  $5 \leq P \leq 45$ . (10 marks)

### QUESTION 2

- a) The first term of a geometric progression (GP) is 3 and the common ratio is 4. Find the fifth term. (5 marks)
- b) Define a fraction and explain the various types of fractions (5 marks)
- c) Consider the universal set  $T = \{0, 2, 4, 6, 8, 10, 12\}$  and its subsets  $C = \{4, 8\}$ ,  $D = \{10, 0, 2\}$ ,  $E = \{0\}$ . Find the following by use of Venn diagrams.
- $D \cap E$  (5 marks)
  - $C \cap D \cap E$  (5 marks)

### QUESTION 3

- a) Analyze the continuity of  $f(x)$  at  $x = \frac{1}{8}$  for  $f(x) = 3 + 8x$  and  $0 \leq x \leq 20$  (5 marks)
- b) Distinguish between the following terms; (6 marks)
- i. Set complement and set difference
  - ii. Whole numbers and integers
  - iii. Multiple and common multiple
- c) Determine the present value of a series of 8 annual payments of sh.30, 000 each, the first of which begins one year from today. Assume interest rate of 6% per year compounded annually (9 marks)

### QUESTION 4

- a) The nominal interest rate on investment is 7% per year. What is the effective annual interest rate if interest is compounded semiannually? (9 marks)
- b) Describe the various methods of representing sets (4 marks)
- c) A firm sells a single product for sh.65 per unit. Variable costs per unit sh.47.50 per unit and annual fixed costs are sh. 100.000. Construct the profit function stated in terms  $x$ , the number of units produced and sold. Determine the breakeven output and the profit earned if annual sales are 20,000 units (7 marks)

### QUESTION 5

- a) Expand  $(x + y)^3$  by applying the principle of mathematical induction (9 marks)
- b) Mary, John and Ann are business partners. They share profit and loss in the ratio 3:2:4 respectively. If the profits for the year 2008 are sh.360, 000. Calculate the share of each partner? (5 marks)
- c) A person pays sh. 1,000,000 for a new house. A down payment of sh. 300,000 leaves a mortgage of sh.700,000 with interest computed at 10.5% per year compounded monthly. Determine the monthly mortgage payment if the loan is to be repaid over 20 years (6 marks)