# MACHAKOS UNIVERSITY

**University Examinations 2017/2018**

**SCHOOL OF PURE AND APPLIED SCIENCES**

**DEPARTMENT OF MATHEMATICS AND STATISTICS**

**FIRST YEAR FIRST SEMESTER EXAMINATION FOR BACHELOR OF AGRIBUSINESS**

**BMS 100: MANAGEMENT MATHEMATICS.**

**DATE: 14/12/2017** **TIME: 2.00-4.00 PM**

**INSTRUCTION:**

**Answer Question One and Any Other Two Questions**

**QUESTION ONE (30 MARKS)**

a) Solve the following simultaneous equation using substitution method (4marks)

$$3x + y = 7$$
$$5x + 2y = 12$$

b) Differentiate the function $y = 3x^3 + 7x^2 + 9x + 20$ with respect to *x*. (2 marks)

c) Let the set K={a,b},L={c,d},M={b,d} ,find:
K∪L, K∩M, K∪ (L∪M) and (K∩L)∩M (4 marks)

d) A rectangular room is 4 metres longer than it is wide .if its area is $12m^2$ .find its dimensions.

(3 marks)

e) Find the derivative of $y=2x^2+3$ with respect to *x* using first principles. (4 marks)

f) Evaluate $\int(6x^3-4x^2+x^2)\,dx$ (3 marks)

g) The 6th term of an A.P is -5 and the 10th term is -21 find the sum of the first 30 terms.

(5 marks)

f) Solve the equation $2x^2 - 3x - 4 = 0$ , by completing square method. (5 marks)

**QUESTION TWO (20 MARKS)**

a) The displacement of particle S, meters covered by a moving particle after *t* seconds is given by

$$S = 2t^3 + 4t^2 - 8t + 3$$

Find i) its velocity at *t=2* and *t=3* (4marks)

ii) The instant at which the particle is at rest. (4marks)

b) Differentiate the function $y = 3x^3 + 7x^2 + 9x + 20$ with respect to *x, at* x=1 (4 marks)

c) Solve the equation $2x^2 - 3x - 4 = 0$ ,by quadratic formulae, (4 marks)

d) Given that $y = (x^2 - 5x + 2)(2x^2 + 7)$ find; $\frac{dy}{dx}$ (4 marks)

**QUESTION THREE (20 MARKS)**

a) The sum of the first 3 terms of a Geometric series is 26,if common ratio is 3 ,find the sum of the first 6 terms (5 marks)

b) When a body is projected vertically upwards with a velocity of $7m/s$ the height reached by the body after t seconds is given by the formula $s = 7t - 4.9t^2$ .find the greatest height to which the body will rise and the time taken. (9 marks)

c) If Ksh. 30000 is invested at a compound interest of 8% per annum, determine using geometric progression the

i) Value after 8 years (2 marks)

ii) Time it takes to reach more than Ksh.50,000 correct to the nearest year. (4 marks)

**QUESTION FOUR (20 MARKS)**

a) Define the following items

(i) Null set
(ii) A sub-set
(iii) Compliment.
(iv) Equal sets (4marks.)

b) A survey in a class shows that 15 pupils play cricket, 11 play tennis and 6 play both cricket and tennis. How many pupils are in the class if everyone plays at least one of these games. (6 marks)

c) Find the area enclosed between the curve $y = x^2 - 3x + 2$ and the $x$ axis. (5 marks)

d) Determine the stationary points of the curve$y = (5 + x)(1 - x)$,sketch the curve.(5 marks)

**QUESTION FIVE (15 MARKS)**

a) Solve the linear inequalities

i) $52x + 3 < 7$

ii) $-4x + 2 < -6$ (4marks)

b) Find the gradient of the tangent to the curve $y = \frac{1}{x}$ at the point where $x=1$ (4 marks)

c) The area of a circle is increasing at the rate of $3cm^2/s$. Find the rate of change of the circumference when the radius is *2cm* (6 marks)

d) Solve the simultaneous inequalities

i) $x + 10 \geq 6$ ii) $12 - x \geq 5 \leq 2x - 2$

$x - 2 \leq 3$ (6 marks)