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 SCIENCE IN BIOLOGY

SMA 100: MATHEMATICS FOR SCIENCE

DATE: 5/12/2017 **TIME: 8:30 – 10:30 AM**

INSTRUCTIONS

Answer ALL the questions in Section A and ANY TWO Questions in Section B

SECTION A: (COMPULSORY)

QUESTION ONE (30 MARKS)

a) Define the following terms

i) Permutation

ii) Combination

iii) Identity equation

iv) Conditional equation

v) Arithmetic progression (5 marks)

b) Solve for y $\frac{8y-4}{12y+2} = \frac{4y-18}{6y+6}$ (4 marks)

c) Find the 37^{th} term of the progression $-8, -5, -1, 2, \ldots$ (4 marks)

d) Solve the inequality $|x-5| < 2$ and plot the graph (4 marks)

e) Solve the following quadratic equation by quadratic formula.

$$2x^2 - 8x - 10 = 0$$ (3 marks)

f) If $a=3$, $tn=96$, $sn=189$. Find *r* and *n where a is the first term tn is the* n^{th} term s_n is the sum of the n term r is the common ration and n is the number of terms. (4 marks)

h) Solve the equation $\tan\theta = 2sin\theta$, for value of θ from 0° to 360° (3 marks)

g) suppose a die was tossed 2 times what is the probability of getting
   i) 6 in two occasions
   ii) A sum of 9
   iii) A sum of 7 or 8 (3 marks)

SECTION B: ANSWER ANY OTHER TWO QUESTIONS

QUESTION TWO (20 MARKS)

a) Simplify $\frac{1}{\sqrt{x^2-a^2}}$ when $x = a\ cosec\theta$ (5 marks)

b) Solve the equation $1 + cos\theta = 2sin^2\theta$, for the values of θ from 0° to $360°$ (5 marks)

c) Sketch the graph of $y = 3\sin 2(x - \frac{\pi}{4})$ $for\ 0 \leq x \leq 2\pi$. Find its wavelength and amplitude (5 marks)

d) A committee of 6 people is to be selected from 4 women and 7 men. In how may ways:
   i) Can the committee be selected? (2 marks)
   ii) Can the committee be selected if three men must be in the committee? (3 marks)

QUESTION THREE 20 MARKS

a) Solve for *x*, $3^{2x} - 1 = 0.07$ (5 mark)

b) If $\log_3(2x+3) = log_3 4 + 3$ solve for x (5 marks)

c) Simplify $\frac{16!}{9!7!} + \frac{16!}{10!6!} + \frac{16!}{11!5!}$ (3 marks)

d) Determine the value of x for which the following form an AP.

$8 - 6x, 2x^2 - 2, 18x - 20$ (3 marks)

e) The first term of a G.P. is 5, and the common ratio is -3, which term is equal to -135) (4 marks)

QUESTION FOUR 20 MARKS

a) In a class of 120 students ,70 students study statistics ,50 study chemistry and 30 study both chemistry and statistics. If a student is selected at random, find the probability that he studies

i) chemistry and not statistics
ii) statistics and not chemistry
iii) statistics or chemistry
iv) neither chemistry nor statistics (8 marks)

b) For the following grouped data find the

i) Median
ii) Mode
iii) Mean (12 marks)

class	frequency
10-19	6
20-29	5
30-39	11
40-49	8

QUESTION FIVE 20 MARKS

a) Solve the following equation by quadratic formula.
$px^2 - (2p + q) + (p + q) = 0$ (4 marks)

b) Solve the inequality and represent it graphically $|2x - 10| \geq 12$ (4 marks)

c) Solve for *x*, $4^{2x} - 2 = 0.2$ (4 marks)

d) i) Solve each of the following logarithmic equation

$$\log_2(x - 1) + log_2 x = 3$$ (3 marks)

ii) Evaluate

$$5\sqrt{\frac{0.66x2.14}{13.62+365}}$$ (5 marks)