**JOMO KENYATTA UNIVERSITY**

**OF**

**AGRICULTURE AND TECHNOLOGY**

**UNIVERSITY EXAMINATIONS 2014/2015**

**YEAR I SEMESTER II SPECIAL/SUPPLEMENTARY EXAMINATIONS FOR THE DEGREE OF BACHELOR OF BUSINESS INFORMATION, BACHELOR OF PUBLIC HEALTH AND BACHELOR OF SCIENCE IN MATHEMATICS AND COMPUTER SCIENCE**

**SMA 2104: MATHEMATICS FOR SCIENCE**

**DATE: AUGUST 2015 TIME: 2 HOURS**

**INSTRUCTIONS: ANSWER QUESTION ONE (COMPULSORY) AND ANY OTHER TWO QUESTIONS**

**QUESTION ONE (30 MARKS)**

(a)(i) Distinguish between permutation and combination. [2 marks]

 (ii) In how many ways can five blue beads, four green beads, two red beads and one white

 bead be arranged in a row if beads of the same colour are indistinguishable? [4 marks]

(b) Without using table or calculators evaluate;

 (i) Sin 1050 [3 marks]

 (ii) Cos 2550 [3 marks]

(c) Solve the simultaneous equations;

 XY = 160

 Log x – 3 log y = 1

 For x>0, y > 0 [5 marks]

(d) Determine the semi-interquartile for the marks of students A and B as given below;

 27, 37, 47, 57, 67 [3 marks]

(e) In an A.p the 4th term is 13 and the 7th term is 22

 Determine;

1. The first term and common difference [4 marks]
2. The value of n if the nth term is 100 [3 marks]
3. The value of m if the sum to m term of the series is 175 [3 marks]

**QUESTION TWO (30 MARKS)**

1. Simplify without using tables/calculators

 Sin2 3150 (1-tan2 2100

 (1 + cos2 1200) (1 + tan2 330) [3 marks]

1. The mass of 100 students in Jomo Kenyatta University are shown in the following frequency distribution given below. For this frequency distribution:
2. State the size of each class interval. [2 marks]
3. State the model class [2 marks]
4. Calculate the mean send the standard deviation. [8 marks]
5. Calculate the minimum acceptable mass if the heaviest 10% of the students are accepted for special weight training. [5 marks]

Mass (Kg) Frequency

53 – 57 2

58 – 62 12

63 – 67 12

68 – 72 25

73 – 77 27

78 – 82 10

83 – 87 9

88 – 92 3

**QUESTION THREE (30 MARKS)**

1. Determine the roots of the equations;
2. 4x2 + 4x – 1 = 0 [2 marks]
3. 12x2 + 19x + 4 = 0 [2 marks]
4. 35x2 – x-12 = 0 [2 marks]
5. Solve the equations
6. Log2 (x+2) + log2 (x -7) [3 marks]
7. $Log\_{x}^{2}$+ 64 $log\_{2}^{x}$= 16 [3 marks]
8. For two A and B, P (^A) = 3/10 and P(B) = 13/20. If P (AB) = 9/20

Find

1. P(AB) [2 marks]
2. P( ~AB) [3 marks]
3. P(A ~ B) [3 marks]

**QUESTION FOUR (30 MARKS)**

1. (i) Simplify;

 $\sqrt{35}$ - $\sqrt{30}$ leaving the answer in the form a + bre when a, b and c are integers

 $\sqrt{35}$ + $\sqrt{30}$

 [3 marks]

(ii) Simplify;

 $\left(\frac{\sqrt[6]{5}-\sqrt[4]{3}}{\sqrt[2]{5}- \sqrt{3}}\right)$ $\left(\frac{\sqrt[5]{5}-\sqrt[3]{3}}{\sqrt[3]{5}- \sqrt[2]{3}}\right) $ [4 marks]

1. Simplify without using labels or calculators

 3 Cos2 450 Cos 420 + tan2 600 sin 480 – 9 Cos 600 Cos 420 [6 marks]

1. Write down the expansion of (Hx)20 in a ascending power in x up to and including the term in x3. Find also the coefficients of x12 and x18. [4 marks]
2. Solve the equation

 Sin-xx + Sin-14x = $^{51}/\_{2}$ [3 marks]

**QUESTION FIVE (20 MARKS)**

1. Find using first principles the sum of the first 18 terms, S18 of the common G.P with first term 5 and common ratio 1/3 [6 marks]
2. A rational number is a number which can be expressed in the form of $^{p}/\_{q}$ where p and q are integers and q ≠ 0. Prove by contradiction that $\sqrt{2}$ is irrational. [4 marks]
3. Show that $log\_{5}^{x}$n = $\frac{1}{n}$ $log\_{5}^{x}$ [4 marks]

Hence solve the equation

$log\_{6x5}^{x}$ + $log\_{5^{2}}^{x}$ + $log\_{\sqrt{5}}^{x}$ = 35 [6 marks]