MURANG'A UNIVERSITY COLLEGE
(A constituent college of Jomo Kenyatta University of Agriculture and Technology)

UNIVERSITY EXAMINATIONS 2013

FIRST YEAR FIRST SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE IN INFORMATION TECHNOLOGY (SELF – SPONSORED)

SMA 2104: MATHEMATICS FOR SCIENCES

DATE: 11 DECEMBER 2013 TIME: 2 HOURS

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

QUESTION ONE (30 MARKS)

(a) Solve the equation $35x^2 - x - 12 = 0$ by the method of factorization and give the roots correct to two decimal places. (4 marks)

(b)In an arithmetic progression the fourth term is 13 and the seventh term is 22
Determine:
(i) the first term and the common difference, (3 marks)
(ii) the value of n if the nth term is 100, (1 mark)
(iii) the value of m if the sum to m terms of the series is 175. (2 marks)

(b) Factorize the expression $6x^3 - 17x^2 - 4x + 3$ and hence solve the cubic equation $6x^3 - 17x^2 - 4x + 3 = 0$. (5 marks)

(c) Calculate the remaining angle and sides of triangle ABC in which A = 73°, B = 49° and a = 6.1 cm. (5 marks)

(e) For the following data:

Length (cm)	Frequency
25 – 29	5
30 – 34	12
35 – 39	25
40 – 44	11
45 – 49	1

(i) state the lower and upper class boundaries of the class 25 – 29 , (1 mark)

(ii) state the modal class, (1 mark)

calculate the mean. (3 marks)

(f) Two dice are thrown. What is the probability that the difference of the numbers shown on the two uppermost faces will equal:

(i) 2? (2 marks)

(ii) 3 or more? (2 marks)

(iii) less than 3? (1 mark)

QUESTION TWO(20 MARKS): OPTIONAL

(a) Express:

(i) $6\sqrt{5}$ in the form $\sqrt{p}$ where p is an integer. (1 mark)

(ii) $\frac{3}{5}\sqrt{(\frac{6}{5})}$ in the form $\sqrt{(\frac{p}{q})}$ where p and q are integers. (2 marks)

(b) Given that $\sqrt{35}$ = 5.9160798 correct to seven decimal places, evaluate $\frac{\sqrt{7}-\sqrt{5}}{\sqrt{7}+\sqrt{5}}$ correct six decimal places without use of tables or calculator. (4 marks)

(c) Solve without tables or calculator:

(i) $(9)^{-x+1} = (81)^{5-x}$ (3 marks)

(ii) $(\frac{4}{5})^{5x-4} = (\frac{5}{4})^{4x-5}$ (3 marks)

(d) (i) Solve without use of tables or calculator the equation $2^x = 32$; (1 mark)

(ii) Use tables or calculator to solve the equation $2^x = 10$, and give your answer correct to two decimal places. (2 marks)

(iii) Solve the equation $\log_2(x+2) + \log_2(x-2) = 5$ for $x > 0$. (4 marks)

QUESTION THREE(20 MARKS): OPTIONAL

(a) Determine the minimum value of the function $x^2 - 12x + 9$ *and the value of* x for which this minimum is attained. (5 marks)

(b) (i) Find using first principles the sum of the series

12 +17 +22 + 27 + … + 102 (4 marks)

(ii) In an arithmetic progression the first term is 6 and the common difference is 4. Find the tenth term and the sum of the first ten terms. (3 marks)

(c) In a geometric progression the third term is 81 and the sixth term is 3. Determine the first term, the common ratio, and the sum to infinity of the series.

(5 marks)

(d) Mrs. Prudence deposits 2000 US dollars in a savings account on 1 January each year for 20 years. If the account gives 3% compound interest per annum, what will be the total value of her savings at the end of 20 years? Answer correct to the nearest US dollar.

(3 marks)

QUESTION FOUR(20 MARKS): OPTIONAL

(a) Calculate the mean and the standard deviation of the distribution:

Volume (cm^3)	Frequency
40 – 44	8
45 – 49	20
50 – 54	45
55 – 59	25
60 – 64	2

(8 marks)

(b) A bag contains 5 white, 3 yellow and 2 green balls all identical except for the colour. A ball Is drawn and set aside. A second ball is drawn. What is the probability that:

(i) the balls are of different colours? (3 marks)

(ii) at least one of the balls is white? (3 marks)

(iv) Exactly one of the balls is white? (3 marks)

(c) Expand $(1 + 3X)^6$ and simplify your answer. Hence use your expansion to estimate 1.03^6 correct to four decimal places. (3 marks)