MURANG'A UNIVERSITY OF TECHNOLOGY

SCHOOL OF PURE AND APPLIED SCIENCE

DEPARTMENT OF APPLIED SCIENCE

UNIVERSITY ORDINARY EXAMINATION

2017/2018 ACADEMIC YEAR

FIRST YEAR **FIRST** SEMESTER EXAMINATION FOR BACHELOR OF SCIENCE IN ORGANIC CHEMISTRY

AMM102 – MATHEMATICS FOR SCIENCE

DURATION: 2 HOURS

DATE: 13TH DECEMBER 2017

TIME: 9.00AM – 11.00AM

Instructions to Candidates:

1. Answer **Question 1** and **Any Other Two** questions.
2. Mobile phones are not allowed in the examination room.
3. You are not allowed to write on this examination question paper.

SECTION A (Compulsory)

QUESTION ONE (30 Marks)

a) The rots of the equation $3x^2 + 4x - 5 = 0\ are\ \propto, \beta$. Find the values of

$\frac{1}{\propto} + \frac{1}{\beta}$ and $\propto^2 + \beta^2$ (4 Marks)

b) The quadric function

$f(x) = a(x-h)^2 + k\ a \neq 0$ is in standard form. Rewrite the function $f(x) = 3x^2 - 12x + 17$ in standard form giving the values of k. (3 Marks)

c) A mixed football team containing 6 men and 5 women is to be chosen from 9 men and 7 women. In how many can this be done? (3 Marks)

d) The sum of a number of consecutive terms of an arithmetic progression is $-19\frac{1}{2}$, the first term is $16\frac{1}{2}$ and the common difference is -3. Find the number of terms. (3 Marks)

e) In triangle XYZ, XY=3.5, YZ=4.5 and ZX=6.5. Calculate the size of angle Y. (3 Marks)

f) Determine the mean absolute deviation of the following distribution. (4 Marks)

Length (cm)	25-29	30-34	35-39	40-44	45-49
Frequency	5	12	25	11	7

g) A bag A contains 6 white and 4 blue balls while B contains 5 white and 3 blue balls. If one ball is drawn from each bag, find the probability that;

i. Both are white

ii. Both are blue

iii. One is blue and one is white. (6 Marks)

h) Solve the equation $log_x^2 + 48log_2 x = 14$ (4 Marks)

SECTION B (Answer any two questions)

QUESTION TWO (20 Marks)

a) Without using tables or a calculator, simplify;

$3cos^2 45° cos42° + tan^2 60° sin48° - 9cos60° cos42°$ (4 marks)

b) Solve the equation $3^x \cdot 7^{2x+1} = 37$ correct to three significant figures. (4 Marks)

c) Find the sum of the following series;

$\sum_{r=4}^{16} \left(5 - \frac{r}{4}\right)$ (4 marks)

d) Graph the quadratic function $x^2 + 6x + 8$ in general form. (8 Marks)

QUESTION THREE (20 Marks)

a) Calculate the variance and standard deviation of the distribution given below. (7 Marks)

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

b) Given the expansion $(2 + 3x)^8$. Find

i. The coefficient of x^4

ii. Sixth term of the expansion (4 Marks)

c) A basket contains 3 oranges and 7 mangoes. A boy picked two fruits at random, one at a time without replacement. What is the probability that;

i. Both were mangoes

ii. That one was an orange and one a mango

iii. That there was at least one mango (6 Marks)

d) A number is chosen at random from the numbers 1,2,3…,30. Find the probability that it is;

i. Divisible by both 3 and 4 (1 Mark)

ii. Divisible by 4, given that it is divisible by 3 (2 Marks)

QUESTION FOUR (20 Marks)

a) Solve the equation $3\cos 2\theta + \sin\theta = 1$ for $0 \leq \theta \leq 360$ (4 Marks)

b) Show that $2sin75°cos45° = \frac{\sqrt{3}+1}{2}$ (3 Mark)

c) Factorise the expression $6x^3 - 17x^2 - 4x + 3$ and hence solve the cubic equation $6x^3 - 17x^2 - 4x + 3 = 0$ (4 Marks)

d) Obtain the expansion of $(1 + x - 2x^2)^8$ upto the term x^3 (4 Marks)

e) How many even numbers greater that 50,000 can be formed with the digits 3,4,5,6,7,0 without repetitions. (5 Marks)

QUESTION FIVE (20 Marks)

a) A woman makes a single deposit of Sh. 1,600 in an account which pays compound interest at a rate of 6% p.a.

i. How much was the investment worth after twelve years? (2 Marks)

ii. After how many years will the investment be worth three times its value? (3 Marks)

b) Find the smallest number of terms of the geometrical progression $8 + 24 + 72 + \cdots$ that will give a total greater than 6000000. (5 Marks)

c) Without using tables or calculators, determine the value of x if;

$x = \frac{\log 75+\log 9+\log 5}{\log 5+\log 45}$

(3 Marks)

d) Solve the triangle PQR given p=6.05cm, q=3.65cm and R=37.5^o (4 Marks)

e) Express $\frac{11}{4}\sqrt[3]{\left(\frac{5}{7}\right)}$ in the form $\sqrt[3]{\frac{p}{q}}$ where p or q are integers. (3 Marks)