TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF APPLIED AND HEALTH SCIENCES

DEPARTMENT OF MATHEMATICS AND PHYSICS

UNIVERSITY EXAMINATION FOR:

BACHELOR OF SCIENCE IN COMMUNITY HEALTH /BSMR

AMA 4104 / AMA 4104: MATHEMATICS FOR SCIENCES

PAPER 11

END OF SEMESTER EXAMINATION

SERIES: FIRST SEMESTER YEAR ONE

TIME: 2 HOURS

DATE: APRIL 2016

Instructions to Candidates

You should have the following for this examination

-Answer Booklet, examination pass and student ID

This paper consists of FIVE Questions. Attempt **QUESTION ONE** and any other TWO.

Do not write on the question paper.

QUESTION ONE (30 MARKS)

a) (i) Simplify $\dfrac{x^{-\frac{2}{3}} \times y^{-\frac{1}{3}}}{(x^4 y^2)^{-\frac{1}{6}}}$ (4marks)

(ii) Simplify $\sqrt{5+2\sqrt{6}}$ (6 marks)

b) When the expression $px^4 + qx^3 + 3x^2 - 2x + 3$ is divided by $x^2 - 3x + 2$ the remainder is x+1; find the values of p and q. (6 marks)

c) The roots equation $x^2 + 5x - 7 = 0$ are $\sim$, . Find the equation whose roots are $\sim^2$ *and* ^{2} without solving the quadratic equation. (5 marks)

d) Two points A and B on a straight coastline are 1km apart B being due east of A. If a ship is observed on bearing 167° and 205° from A and B respectively. What is its distance from the coastline at A and B. (4 marks)

e) A bag contains 3 black balls and 2 white balls. A ball is taken from the bag without being replaced ; a second ball is chosen. Using a tree diagram, find the probability that:
(i) They are both black
(ii) One is black and one is white. (5marks)

QUESTION TWO (20 MARKS)

a) A drilling machine is to have 6 speeds ranging from 50 rev/min to 750 rev/min. If the speeds form a geometric progression, determine their values, each correct to the nearest whole number. (6 marks)

b) Simplify $\dfrac{x^2(x^2+1)^{\frac{-1}{2}} - (x^2+1)^{\frac{1}{2}}}{x^2}$ (5 marks)

c) The nth term in the series 2½, 4, 5½, 7, … is 22. find the number of terms. (4marks)

d) Obtain the first four terms of the expansion of $\left(1 + \frac{1}{2}x\right)^{10}$ in ascending powers of x.
Hence find the value of $(1.0005)^{10}$ correct to four decimal places. (5 marks)

QUESTION THREE (20 MARKS)

a) By completing the square, find the greatest values of the function
$f(x) = -7 + 12x - 3x^2$ (5 marks)

b) (i) A radio tube may be purchased from five suppliers. In how many ways can three suppliers be chosen from the five. (2 marks)
(ii) How many even numbers greater than 2000, can be formed with the digits 1,2,4,8, if each digit maybe used only once in each number. (5 marks)

c) In a factory production process is known to be 5% defective. From a large batch of items produced by the process, two are selected at random. What is the probability that:
(i) Both will be good
(ii) Both will be defective
(iii) The first is good and the second is defective and
(iv) The first is defective and the second is good.
(8marks)

QUESTION FOUR (20 MARKS)

a) Draw the graph of y = sin 20° for values of θ° from 0° to 360° at intervals of 30° (7 marks)

b) The roots of the equation $x^2 + 6x + q = 0$ are $\sim$, *and* ~ -1. Find the value of q. (5 marks)

c) Solve the following equations by methods indicated:

(i) $5x^2 - 10x + 4 = 0$,giving your answer to three significant figures. (Quadratic formulae). (4 marks)

(ii) $3x^2 + 8x - 3 = 0$ (completing the square) (4 marks)

QUESTION FIVE (20 MARKS)

a) From the frequency distribution given below, find :

(i) the mean using an assumed mean A=27 (4 marks)

(ii) the mode. (5 marks)

Height	frequency
10 – 14	12
15 – 19	17
20 – 24	22
25 – 29	27
30 – 34	32
35 – 39	37
40 – 44	42

b) In a triangle XYZ, YZ =15.2 cm, angle YXZ = 51° and XYZ = 67°. Calculate :

(i) The unknown sides and angle (5marks)

(ii) The area of triangle XYZ (2 marks)

c) Express $\log \frac{100a^2}{b^3\sqrt{c}}$ in terms of log a, log b and log c (4 marks)