TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF APPLIED AND HEALTH SCIENCES

DEPARTMENT OF MATHEMATICS & PHYSICS

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UNIVERSITY EXAMINATION FOR:

DIPLOMA IN MARINE ENGINEERING

EMR 2106: ENGINEERING MATHEMATICS I

END OF SEMESTER EXAMINATION

SERIES: DECEMBER 2016

TIME: 2HOURS

DATE: Pick Date Dec 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 (Compulsory) and any other TWO questions.
Do not write on the question paper.

Q.1 a) Determine the value of

7/6 of $(3\frac{1}{2} - 2\frac{1}{4}) + 5\frac{1}{8} \div 3/16 - \frac{1}{2}$ (4 marks)

b) If three people can complete a task in 4 hours, how long will it take 5 people to complete the same task.   (3 marks)

c) An alloy is made up of Metals A and B in the ratio 2.5:1 by mass.

How much of A has to be added to 6Kg of B to make the alloy.   (2 marks)

d) A drilling Machine is to have a speeds ranging from 50rev/min to 750 rev/min. if the speeds form a geometric progression, determine their values correct to the nearest whole number.   (8 marks)

e) Three numbers are in arithmetic progression. Their sum is 15 and their product is 80;

Determine the three numbers.   (7 marks)

f) The amount of swing in a certain mechanical system is given by $S = Ke^{-0.1t}$ where k is a constant.

Determine the time it takes for the amount of wing to reduce quarter the initial amount.   (6 marks)

Q.2 a) The frequency distribution for the value of resistance in ohms of 48 resistors is as shown.

Class	Frequency
20.5 – 20-.9	3
21.0 – 21.4	10
21.5 – 21.9	11
22.0 – 22.4	13
22.5 – 22.9	9
23.0 – 23.4	2

(i) Form a accumulative frequency distribution for this data and draw the corresponding ogive.

(ii)   Determine the mean value of resistance.

(iii)   Calculate the standard deviation.   (15 marks)

b)   For the following set of data 27.90, 34.70, 50.40, 18.92, 47.60, 39.68

Determine

(i)   The mean
(ii)   The median
(iii)   The mode   (5 marks)

Q.3   Solve for x in the following equations

a) $2 \log_3 X + \log_x 3 = 9/2$ (8 marks)

b) $\log 12 + 3\log x = \log 96$ (4 marks)

c) $8^{3x+2} = 5^{2x-7}$ (4 marks)

d) $2^x \bullet 2^{x+1} = 10$ (4 marks)

Q.4   a)   In a geometric progression, the eighth term is 8 times the fifth term and the sum
          of the 6th and the seventh term is 288.

Determine:

(i)   The common ratio
(ii)   The first term
(iii)   The sum of the first ten terms.   (7 marks)

b)   If Ksh.800 is invested at a compound interest of 7.5% per annum, determine

(i)   The value after 5 years
(ii)   The time correct to the nearest year it takes for the amount to double.

          (6 marks)

c)   The eighth term of an arithmetic progression is twice the third term and the sum of the
          first 8 terms is 39.

(i)   Find the first three terms of the progression.

(ii)   Show that the sum of the terms is 3/8n (n+5).   (7 marks)

Q.5   a)   Convert the following numbers to binary number.

(i) $(22)_{10}$

(ii) $(546)_8$ (6 marks)

b)   Convert the following to decimal number.

(i) $(465)_8$

(ii) $(10101111)_2$

(iii) $(b539)_{16}$ (9 marks)

c)   Convert to hexa-decimal

(i) $(5072)_{10}$

(ii) $(635)_8$ (5 marks)