MACHAKOS UNIVERSITY

University Examinations 2020/2021 Academic Year

SCHOOL OF PURE AND APPLIED SCIENCES

DEPARTMENT OF MATHEMATICS AND STATISTICS

FIRST YEAR FIRST TERM EXAMINATION FOR

CERTIFICATE IN MECHANICAL ENGINEERING

1501/103: MATHEMATICS I

DATE: 3/6/2021 **TIME: 11.30-2.30 PM**

INSTRUCTIONS:

Answer **ALL** the Questions

Show **ALL** your working clearly

QUESTION ONE

a) Given that F = $\frac{1}{2}m\ (v^2 - u^2)$

i. Make m the subject of the formula

ii. Find the value of m if F = 1136, V = 14.8 and U = 9.24 (5 marks)

b) Simplify the following

i. 1m:30cm

ii. $3\frac{5}{6} : 1\frac{3}{20}$ (5 marks)

c) A certain sum of money is divided in the ration $1\frac{1}{2} : 2\frac{1}{3} : 3\frac{1}{4}$. If the largest share is Shs. 156, what is the sum divided? (4 marks)

d) Given that y is inversely proportional to x^2 and y = 100 when x = 4, determine

i. Y when x = 6

ii. X when y = 25 (6 marks)

QUESTION TWO

a) i Express in logarithmic notation $a = b^c$

ii Express in index notation $log_a x = -3$

iii Express as a single logarithm 3log2 – 2log6 + 2log3 (5 marks)

b) Simplify

i. $\frac{(2^3)^4 \ x \ (3^2)^2}{16^2 \ x \ 9^3}$ using indices

ii. log 25 – log 625 + log 125 (6 marks)

c) Solve the following equations

i. $\frac{a^3 \ x \ a^x}{a^2} = a^8$

ii. 1 – log (x – 6) = log x

iii. $\left(\frac{1}{4}\right)^y = (32)^{3-y}$ (9 marks)

QUESTION THREE

a) Use logarithms to evaluate

$\sqrt{\frac{0.0782 \ x \ 34.39}{4.836}}$ (7 marks)

b) Evaluate

i. $log_3 \frac{1}{81}$

ii. $\frac{18^0 \ x \ 16^{\frac{1}{2}}}{8}$ (6 marks)

c) Solve the following equation

$3^{x+1} = 2^{2x-3}$ correct to 2 d.p (4 marks)

d) State the number of significant figures in the following measures

i. 6010 km

ii. 42.058 hrs

iii. 85000cm^3 (3 marks)

QUESTION FOUR

a) Evaluate

i. $\frac{8\ x\ 10^{11}\ x\ (2\ x\ 10^{-3})^4}{3.2\ x\ 1.6\ x\ 10^8}$ giving your answer in standard form

ii. $(-3)^2\ x\ (-3)^3\ \div\ (-3)^4$

iii. $\left(\frac{16}{81}\right)^{\frac{1}{4}}$ x $\frac{2^0\ x\ 3^{-2}}{5^{-1}}$ (10 marks)

b) Express the following in fraction form

i. $0.\dot{7}$

ii. 0.123123…… (6 marks)

c) If $2^a\ x\ 3^b = 72$, what are the numerical values of a and b (4 marks)

QUESTION FIVE

a) The length and the width of a room when measured with a metre rule is 9m and 8m respectively, but it is found that the metre rule is $\frac{1}{10}$m too short. What are the dimensions of the room? (5 marks)

b) Solve the following equations:-

i. $\frac{5-x}{4} = \frac{x}{5} + \frac{7}{20}$

ii. 8x – 3y = 39 and 7x + 5y + 4 = 0

iii. $3x^2$ - 4x – 15 = 0 (15 marks)