MACHAKOS UNIVERSITY

University Examinations 2019/2020

SCHOOL OF PURE AND APPLIED SCIENCES

DEPARTMENT OF MATHEMATICS, STATISTICS AND ACTUARIAL SCIENCE

FIRST YEAR SECOND SEMESTER EXAMINATION FOR

CERTIFICATE IN MECHANICAL ENGINEERING (TVET)

1501/103: MATHEMATICS 1

DATE: 29/10/2020 **TIME: 11:30 – 2:30 PM**

INSTRUCTIONS:
Answer all questions

Show all your working clearly.

QUESTION ONE

a) Find the sum of the following series

17 + 17 ¼ + 17 ½ + ……..….to 21 terms (4 marks)

b) Given that 2 + b + 32 + ……..….form a G.P;

Determine

i) the value of b

ii) the common ratio

iii) the sum of the first 10 terms of the G.P (6 marks)

c) Determine the stated term in the following series

i) 11 + 8 + 5 + ……the 14^{th} term

ii) 0.75 + 1.5 + 3 + ……the 10^{th} term (6 marks)

d) If Kshs 78.60 = 1 US Dollar and Kshs 125.15 = £1. Find;

i) How many dollars would a traveller, with Kshs half a million receive for the journey.

ii) How much an importer of a machine from England would pay if it costs £15,000.

(4 marks)

QUESTION TWO

a) Convert

i. 1046.24_8 to denary

ii. 465_{ten} into duodemial (5 marks)

b) Add 243_7 to 26_7 and multiply the result by 35_7 (5 marks)

c) Solve the following equations

i. Log (5x +75) – 2 log 3 = log (2x-9)

ii. $32^{x-3} \times 4^{x+3} = 128 \div 2^x$ (10 marks)

QUESTION THREE

a) Simplify the following ratios

i) 5/6 : 3/10

ii) 165m : 2.75km (5 marks)

b) i) Divide 858 in the ration ½ : 1/3: ¼

ii) Decrease $8\frac{4}{9}$ in the ratio 18:19

iii) Increase sh 1440 in the ratio 7:4 (8 marks)

c) i) R varies inversely as the square root of S, if R=3, S=4, determine S when R = 5

ii) An article is bought for sh 65 and sold at a profit of 60%. At what price is it sold? (7 marks)

QUESTION FOUR

a) The 5^{th} term of an A.P is 82 and the 12^{th} term is 103. Determine

i) The first term and the common difference

ii) The sum of the first 18 terms (6 marks)

b) Given the series 27 + 18 +12 + ……find,

i) The common ration

ii) The sum to infinity (4 marks)

c) The first, fifth and seventh terms of an A.P correspond to the first three consecutive terms of a decreasing G.P. The first term of each progression is 64, the common difference of the A.P is d and the common ratio of the G.P is r.

i. Write down two equations involving d and r and find their values

ii. Using the value(s) of d and r in (i) above find the sum of first 10 terms of the A.P and then of the G.P (10 marks)

QUESTION FIVE

a) Expand the following

i) $(3c + 4)(3c - 4)$

ii) $(2x + 5)(3x + 2)$ (4 marks)

b) Solve the following equations

i) $3x^2 + 17x - 9 = 0$

ii) $2a + b - 1 = 0$ and $3a - 2b = 5$

iii) $\frac{3}{x-1} = \frac{2}{x-5}$ (12 marks)

c) Given that $\frac{y}{x}\sqrt{Py^2 + 1}$ make p the subject of the formula (4 marks)