



MACHAKOS UNIVERSITY

University Examinations 2019/2020

SCHOOL OF PURE AND APPLIED SCIENCES

DEPARTMENT OF MATHEMATICS, STATISTICS AND ACTUARIAL SCIENCE

SECOND YEAR SECOND SEMESTER EXAMINATION FOR

CERTIFICATE IN COSMETOLOGY (TVET)

MATHEMATICS

DATE: 29/10/2020

TIME: 11:30 – 2:30 PM

INSTRUCTIONS: Answer Question One and Any Other Two Questions

1. a) evaluate $\frac{1}{1+\cos 45^\circ} + \frac{1}{1-\sin 45^\circ}$ without using tables or a calculator (5 marks)
- b) Use the quadratic formula to solve the equation (5 marks)
 $Y^2 - 3y - 5 = 0$
- c) The sum of the first four terms of an AP is 32 and the sum of the seven terms is 98.
Find the first term and common difference of A.P. (5 marks)
- d) The sum of the first six terms of AP is 63. Given that the first term of the A.P is 3
- i. Find the common difference of the AP. (2 marks)
- ii. Find the value of n such that the sum of the first n terms of the AP is 165. (4 marks)
- e) Solve the following simultaneous equation (4 marks)
 $2x + y = 4$
 $3x + 4y = 1$
- f) Given that $A = \begin{bmatrix} 3 & 5 \\ 4 & 7 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & 3 \\ -1 & 5 \end{bmatrix}$ Find C if $C = A^{-1} \cdot B$

2. a) Mr. Bukeka earns a monthly salary of ksh.30,000. He is housed by the employer and therefore 15% of his salary is added to the taxable income. He pays a nominal rent of shs.1300. Tax charged as per the table below:

Taxable pay (K€ per month)	Kshs per KE
1-350	2
351-700	3
701-1050	4
1051-1400	5
1401-1690	6
Above 1690	7

Calculate

- i. His taxable pay in K€ per month (3 marks)
 - ii. Mr. Bukekas net tax given that he is entitled to a relief of kshs.900 per month. (7 marks)
 - iii. Mr. Bukekas net salary (3 marks)
- b) Nafula deposited shs.12500 in financial institution that paid compound interest at 8%p.a for 2 years a month. How much interest did the money earn?
- c) Solve for the unknown in the equation

$$\frac{8x-5}{5} + \frac{x-2}{15} - \frac{4x-4}{20} = 0$$

3. a) The fifth and eleventh terms of an arithmetic progression are 27 and 45 respectively Determine the;
- i. 30th term
 - ii. Sum of the first 16th terms (9 marks)
- b) The third, fourth and fifth terms of a G.P are $t + 4, t+10$ and $t+20$ respectively. Determine the
- i. Common ratio
 - ii. First term
 - iii. Sum of the first 12 terms (1 mark)

4. Joan is a sales lady earning a salary of Kshs.30,000 and a commission of 6% for the sales in excess of ksh.100,000. If in June 2016 she earned a total of kshs. 48,000 in salaries and commissions
- a) Determine the amount of sales she made in that month (4 marks)
- b) If the total sales in month of July and August increased by 18% and dropped by 25% respectively calculate:
- i. Jane's commission in the month of July (5 marks)
- ii. Her total earnings in the month of August (5 marks)
- c) Simplify: $\frac{\sqrt{5}}{\sqrt{7}-\sqrt{2}}$ (3 marks)
- d) Find the quadratic equation whose roots are $X = -\frac{2}{3}$ and $x = 2$ (3 marks)