



MACHAKOS UNIVERSITY

University Examinations 2018/2019
SCHOOL OF PURE AND APPLIED SCIENCES

DEPARTMENT OF MATHEMATICS, STATISTICS AND ACTUARIAL SCIENCE

FIRST YEAR SPECIAL/ SUPPLEMENTARY EXAMINATION FOR

BACHELOR OF AGRIBUSINESS AND AGRICULTURE EDUCATION.

KCU 101 – FUNDAMENTALS OF MATHEMATICS.

DATE: 25/9/2019

TIME: 11:00 – 1:00 PM

INSTRUCTIONS

attempt Question 1 and any other 2 Questions.

QUESTION ONE (30 marks)

- a) Determine $\frac{5x^4+3x^3+2x-1}{x-3}$ 5 marks
- b) The number of faults occurring on a production line in a nine-week period are as shown below. Determine the median and quartile values for the data : 30 27 25 24 27 37 31 27 35 5 marks
- c) Transpose the formula $\frac{p}{q} = \sqrt{\frac{a+2b}{a-2b}}$ to make b the subject of the formula. 5 marks
- d) Determine the solutions of the simultaneous equations $y = x^2 + x + 1, y = 4 - x$. 4 marks
- e) Find the gradient of the curve $y = 2t^4 + 3t^3 - t + 4$ at the point (0,4). 5 marks
- f) Solve the following systems by the Gauss-Jordan method: $x_1 + x_2 + 2x_3 = 8; -x_1 - 2x_2 + 3x_3 = 1; 3x_1 - 7x_2 + 4x_3 = 10$. 6 marks

QUESTION TWO (20 MARKS)

- a) Use the factor theorem to factorize $x^3 + 4x^2 + x - 6$ and hence solve the cubic equation $x^3 + 4x^2 + x - 6 = 0$. 8 marks
- b) Using the remainder theorem, solve the equation $2x^3 - x^2 - 7x + 6 = 0$. 6 marks
- c) If $A = i + 3j + 2k, B = 2i + 5j - k, C = i + 2j + 3k$, find $(A \times B) \times C$ 6 marks

QUESTION THREE (20 MARKS)

- a) Resolve $\frac{18+21x-x^2}{(x-5)(x+2)^2}$ into partial fractions. 7 marks
- b) Find the inverse of the matrix $\begin{pmatrix} 3 & 4 & -1 \\ 1 & 0 & 3 \\ 2 & 5 & -4 \end{pmatrix}$. 7 marks
- c) Plot a graph of $y = 3e^{0.2x}$ over the range $x = -3$ to $x = 3$. Hence determine the value of y when $x = 1.4$ and the value of x when $y = 4.5$ 6 marks

QUESTION 4 (20 marks):

- a) A rectangular building is 15m long by 11m wide. A concrete path of constant width is laid all the way around the building. If the area of the path is 60.0m^2 , calculate its width correct to the nearest millimetre. 5 marks
- b) Solve the indicial equation $4^{2x-1} = 5^{x+2}$ 4 marks
- c) Given that $f(x) = \frac{1+x}{1-x}$, find $f(x, y) = \frac{f(x)-f(y)}{1+f(x)f(y)}$. Hence find $(-2, 3)$. 5 marks
- d) The probability of a component failing in one year due to excessive temperature is $\frac{1}{20}$, due to excessive vibration is $\frac{1}{25}$ and due to excessive humidity is $\frac{1}{50}$. Determine the probabilities that during a one-year period a component:
(i) fails due to excessive vibration
(ii) fails due to excessive vibration or excessive humidity, and
(iii) will not fail because of both excessive temperature and excessive humidity. 6 marks

QUESTION FIVE (20 MARKS)

- a) Calculate the mean and standard deviation from the following numbers: 34.61, 34.57, 34.40, 34.63, 34.63, 34.51, 34.49, 34.61, 34.52, 34.55, 34.58, 34.53, 34.44, 34.48 and 34.40 8 marks
- b) Solve the inequality $|5-3t| > 4$ 6 marks
- c) Evaluate $\int_1^3 (x^2 - 4x + 3) dx$. 6 marks