



MACHAKOS UNIVERSITY

University Examinations for 2019/2020 Academic Year

SCHOOL OF PURE AND APPLIED SCIENCES

DEPARTMENT OF MATHEMATICS AND STATISTICS

FIRST YEAR THIRD SEMESTER EXAMINATION FOR

CERTIFICATE IN CIVIL ENGINEERING

1902/106: MATHEMATICS

DATE: 15/12/2020

TIME: 8.30-11.30 AM

INSTRUCTIONS

Must Have A Scientific Calculator and Mathematical Table.

Question 1 Is Compulsory (Section B)

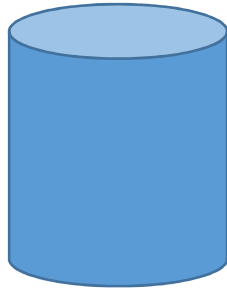
Choose any other 7 questions from Section B.

SECTION A

1. a) A donation of 28 cartons of exercise books were distributed among 288 pupils in a school. If each carton had 144 exercise books, determine the number of books each pupil received (4 marks)
- b) The ratio of men, women to children who attended a church service was 2:3:6 respectively. If there were 150 men, determine;
 - i. the difference between women and men who attended the service (2 marks)
 - ii. the total number of people who attended the service (2 marks)
- c) A hemispherical bowl of internal diameter 42 cm, is filled with milk. Determine the capacity in litres of milk it can hold (4 marks)
- d) The marked price of a fridge was ksh 48000. a customer bought it at 15% discount. If the trader made a profit of 8%, determine the amount of profit made to the nearest whole number in shillings. (4 marks)
- e) Without using a calculator evaluate ${}^5P_2 + {}^6P_3$ (4 marks)
- f) A group of 6 boys has a mean weight of 54kg. when two more boys joined the group one with x kg and the other with $(x + 10)$ kg, the new mean is 55kg. determine the value of x . (6 marks)

SECTION B

2. Consider the figure below:



Given its internal and external radii to be 42cm and 35cm respectively and the height is 53cm (assuming the figure to be closed)

- a) Determine its surface area leaving your answer in terms of π (4 marks)
- b) Find the capacity of the tin in litres (6 marks)
3. a) Express as a single fraction
- i) $\frac{x-3}{4} + \frac{2x-3}{5}$
- ii) $\frac{2x+3}{2} - \frac{x+3}{3}$ (5 marks)
- b) In a class of p students, 3 are absent during a history lesson. If those who are present are to sit in groups of five, how many such groups will there be? (5 marks)
4. a) Find the ratio of $x:y$ in the following equations
- i) $(x + y):(x - y) = 25:7$
- ii) $(3x + 2y):(3x - 2y) = 25:17$
- iii) $\frac{5}{4} = \frac{3x+5y}{3x-5y}$ (6 marks)
- b) If $a:b = 7:11$, find the ratio of $(5a - 3b):(2a + 3b)$ (4 marks)
5. A container in the shape of a cylinder has a radius of 1.5m. It contains water to a depth of 3.5m, a solid plastic sphere of 0.8 m is placed inside the container and the level of water rises to x m. Calculate x to the nearest unit (10 marks)
6. a) If y varies constantly and partially as x : if $x=16$ when $y=2$ and $x=33$ when $y=3$. Find the value of x when $y=5$ (6 marks)

- b) Find the area of a triangular piece of cake measuring 70cm by 45cm by 98cm
(4 marks)

7. a) The table below shows the duration of telephone calls from a shopping center's call box in a day.

Duration (minutes)	$0 < t \leq 1$	$1 < t \leq 2$	$2 < t \leq 3$	$3 < t \leq 5$	Over 5	Total
No of calls	5	18	49	24	4	100

Find

- i. $P(2 < t \leq 5)$
 - ii. $P(2 < 3)$
 - iii. Estimate the value of $(1.5 < t \leq 4)$ (8 marks)
- b) Define the term probability as applied in mathematics (2 marks)
8. a) the sum of the first 5 terms of an A.P is 54 and the sum of the first 8 terms of the same A.P is 84.

Determine

- i. The first term and the common difference of the A.P.
 - ii. The fifth term (6 marks)
- b) Calculate the area of a sector formed by a radius of 6cm and subtending an angle of 73.4° (4 marks)
9. a) If two dice are tossed together and their outcomes recorded in pairs (1,1) (1,2) etc. Construct a table of possible outcomes. Find the probabilities that they show;
- i. The same number
 - ii. Different numbers
 - iii. 2 as one of the numbers (8 marks)
- b) Define the term measures of central tendency (2 marks)
10. a) 9 men working in a factory produces 20 pans in 6 working days. How long will it take 12 men working in the same rate to produce the same number of pans. (5 marks)
- b) An alloy consists of three metals A, B and C. If the ratio of A: B=3:4 and B:C=6:7. find
- i. Proportion of A:C
 - ii. Given the quantity of metal B in the alloy to be 36kg, determine the mass of the alloy. (5 marks)