TECHNICAL UNIVERSITY OF MOMBASA
FACULTY OF ENGINEERING & TECHNOLOGY

DEPARTMENT OF BUILDING AND CIVIL ENGINEERING
DIPLOMA IN CIVIL ENGINEERING

AMA 2250 ENGINEERING MATHEMATICS IV

END OF SEMESTER EXAMINATIONS

SERIES: AUGUST 2019

TIME ALLOWED: 2 HOURS

Instructions to Candidates:

1. You should have the following for this examination
   - Answer Booklet
   - Scientific Calculator. Programmable calculators are prohibited.

2. This paper consists of FOUR questions. Answer ANY THREE questions
3. Maximum marks for each part of a question are as shown
4. Use neat, large and labeled diagrams where required
5. Each new question to begin on a new page

QUESTION ONE

i. The lifetimes of 400 light – bulbs were found to the nearest hour. The results were as follows:

Lifetime (hrs)	0 - 199	200 - 399	400 - 599	600 - 799	800 - 999	1000 - 1199	1200 - 1999
Frequency	143	97	64	51	14	14	17

(a) Construct a histogram and cumulative frequency polygon.

(b) Estimate the percentage of bulbs with lifetime less than 480 hours. **(20 marks)**

QUESTION TWO

i. The time between arrival of 60 operatives at a construction site were recorded to the nearest hour. The data are shown below:

Time (hrs)	0- 19	20- 39	40- 59	60- 79	80- 99	100- 119	120- 139	140- 159	160- 179
Frequency	16	13	17	4	4	3	1	1	1

Determine:

(a) the median

(b) semi – interquartile range

(c) standard deviation

(d) variance **(20 marks)**

QUESTION THREE

i. A construction firm investigates the length of telephone conversations of their administrative staff. Ten consecutive conversations had lengths, in minutes:

10.7, 9.5, 11.2, 7.7, 11.9, 4.2, 10.0, 9.2, 6.5, 9.2.

Determine a 95% confidence interval for the mean conversation length. **(6 marks)**

ii.   The wheat production (in kg) of 20 acres is given as; 1120, 1240, 1320, 1040, 1080, 1200, 1440, 1360, 1680, 1730, 1785, 1342, 1960, 1880, 1755, 1720, 1600, 1470, 1750 and 1885. Determine:

(a) the quartile deviation

(b) Standard deviation   **(8 marks)**

iii.   The operatives of construction company work an average of 267 days per year, with a standard deviation of 29 days. Determine:

(a) the number of days that correspond to a z – score of 2.3 and

(b) variance.   **(6 marks)**

QUESTION FOUR

i.   The following are compressive strength of cement block (in MPa): 1.6, 2.1, 2.6, 2.4, 1.1, 1.7, 2.5, 2.6, 1.3, 2.7, 2.4, 2.6, 3.0, 2.7, 2.3, 2.4, 1.5, 2.2, 2.2, 1.2, 2.2, 2.9, 1.8, 2.2, 2.8, 2.5, 1.8, 1.7, 2.2, 2.8, 1.9, 2.3, 2.3, 2.2, 3.0, 1.9, 1.3, 3.1, 2.3, 2.8, 2.4, 2.6, 2.0, 3.3, 3.0, 2.3, 2.0, 2.2, 2.1, 2.4.

Determine the following:

(a) median

(b) mean

(c) mode

(d) standard deviation

(e) variance

(f) interquartile range

(g) use cumulative graph to show the mean   **(20 marks)**