



MACHAKOS UNIVERSITY

University Examination 2019/2020

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF BUILDING AND CIVIL ENGINEERING

THIRD YEAR FIRST SEMESTER EXAMINATION FOR

DIPLOMA IN CIVIL ENGINEERING

BCECD 305: RESEARECH METHODOLOGY AND PROJECT I

DATE: 9/12/2019

TIME: 2.00-4.00 PM

INSTRUCTIONS

Answer Question ONE(Compulsory) and any other TWO questions

Maximum marks for each part of a question are as shown

QUESTION ONE (30 MARKS) (COMPULSORY)

- a) Explain the meaning of the following terms:
 - i. Research tools
 - ii. Research questionnaire (4 marks)
- b) Outline significance of the following in research work:
 - i. Structured interview
 - ii. Case study (8 marks)
- c) Outline the following:
 - i. Effects of processing data before carrying out analysis.
 - ii. Application of ICT tools in research work. (6 marks)
- d) Explain the following:
 - i. Meaning of alternative hypothesis
 - ii. Significance of analysis of associations
 - iii. Main items considered in designing a research proposal. (12 marks)

QUESTION TWO (20 MARKS)

- a) Explain the following:
- Empirical research
 - Analytical research
 - Two possible aims for carrying out research. (6 marks)
- b) Briefly explain the following:
- Use of telephone facility as a tool for data collection.
 - Random sampling as applied to research.
 - Cluster sampling. (9 marks)
- c) A manufacturer produces 500 diodes per month with a mean life of 65 hours and standard deviation of 72 hours. A random sample of size 50 was tested and found to be having a mean lifetime of 63 hours and a standard deviation of 12 hours. Determine if the batch is superior when mean life time for the sample is more than that of the population at 0.01 level of significance. (5 marks)

QUESTION THREE (20 MARKS)

- a) Distinguish conceptual from descriptive types of research. (5 marks)
- b) Explain the following
- Disadvantages of unstructured type of interview.
 - THREE** Main items that are considered in the main body of quantitative research (7 marks)
- c) A tensile test was carried out on steel material and the following results were obtained:

Applied load (KN)	4.3	8.8	15.0	17.0	21.4	26.8
Extension (mm)	3.6	8.7	10.5	16.2	19.5	21.4

- Calculate the product moment correlation coefficient.
- Use the results obtained to test the hypothesis that applied load has a direct influence on extension at 0.01 level of significance. (8 marks)

QUESTION FOUR (20 MARKS)

- a) Outline tools that can be used to capture information and data during survey. (4 marks)
- b) i State **TWO** distinctions between Primary data and secondary data giving one typical example for each.
- ii Explain the importance of test of hypothesis when carrying out applied type of research. (6 marks)
- c) Paint material in powder form is packed in bags by an automatic packing machine. Mean mass for the packed bags is 4.8 kg and standard deviation is reported by the manufacturer to be 2.45 Kg. A random sample of 55 bags were found to be having a mean mass of 5.47 Kg. Determine at 0.01 level of significance if the machine has to be stopped for remedial measures to be taken if the standard deviation is below the expected. (10 marks)

QUESTION FIVE (20 MARKS)

- a) Briefly explain the following:
- i. Meaning of 'Null hypothesis
- ii. An example of a single tailed test
- iii. Significance of Research ethics. (8 marks)
- b) The following results are for temperature and thrust of a rocket engine. The results are believed to be related:

Engine number	1	2	3	4	5
Temperature ($^{\circ}\text{C}$)	19	15	35	52	35
Thrust (KN)	1.2	1.5	1.5	3.3	2.5

Using the data determine the Pearson's correlation coefficient for the relationship.

- c) Use the results to test the hypothesis that temperature has a direct influence on thrust at 0.01 level of significance. (12 marks)