JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY

SCHOOL OF SPATIAL PLANNING

UNIVERSITY EXAMINATION FOR THE DEGREE OF BACHELOR OF SPATIAL PLANNING AND DESIGN

SEMESTER 2022/2023 ACADEMIC YEAR

CENTRE: MAIN CAMPUS

COURSE CODE: PPB1206

COURSE TITLE: QUANTITATIVE TECHNIQUES IN PLANNING

EXAM VENUE: **STREAM: SPATIAL PLANNING**

DATE: **EXAM SESSION:**

TIME: 2 HOURS

Instructions:

1. **Answer question 1 (compulsory) and ANY other 2 questions.**

2. **Candidates are advised not to write on the question paper.**

3. **Candidates must hand in their answer booklets to the invigilator while in the examination room.**

Question One

a) Differentiate between nominal and ordinal scales of measurement. (4 marks)
b) Distinguish between a parameter and a statistic. (4 marks)
c) Explain the main goals of descriptive and inferential statistics. (4 marks)
d) Define a hypothesis and give any three reasons why it is important. (8 marks)
e) Explain the two types of errors in hypothesis testing. (4 marks)
f) Explain any ways that can be used to reduce type I and Type II errors. (6 marks)

Question Two

a) Give an example of how probability is used in daily life to solve problems. (3 marks)

b) A die is thrown once. Determine the probability of getting a number other than 3? (7 marks)

c) Let A be a set of even numbers less than 9, B be a set of odd numbers less than 10, C be odd numbers less than 6 and D all numbers less than 6. Illustrate the following using venn diagrams.

   i. C as a subset of B. (3 marks)

   ii. A and B as mutually exclusive sets. (3 marks)

   iii. Intersection of B and D. (4 marks)

Question Three

a) Give an example in real life how ANOVA can be used to solve a problem. (5 marks)
b) Suppose the National Transportation Safety Board (NTSB) wants to examine the safety of compact cars, mid size cars, and full-size cars. It collects a sample of three for each of the treatments (cars types). Using the hypothetical data provided below, test whether the mean pressure applied to the driver's head during a crash test is equal for each types of car. Use $\alpha = 5\%$.

   i. State the null and alternative hypotheses. (2 marks)
   ii. Calculate the appropriate test statistic. (8 marks)
   iii. What is your decision Rule? (1 mark)
   iv. What is the Interpretation of your finding? (2 marks)
   v. Which means are different? (2 marks)

Question Four

a) Give an example of how a sample linear correlation coefficient (Pearson product moment correlation coefficient, r) can be used to solve problems in real life. (3 marks)

b) Use the data below (for ice cream sales and average monthly temperature) to answer the following questions:

Month	Average Temp (°C)	Sales (£ 000's)
January	4	73
February	4	57
March	7	81
April	8	94
May	12	110
June	15	124
July	16	134
August	17	139
September	14	124
October	11	103
November	7	81
December	5	80

x	y	x^2	y^2	xy
4	73	16	5329	292
4	57	16	3249	228
7	81	49	6561	567
8	94	64	8836	752
12	110	144	12100	1320
15	124	225	15376	1860
16	134	256	17956	2144
17	139	289	19321	2363
14	124	196	15376	1736
11	103	121	10609	1133
7	81	49	6561	567
5	80	25	6400	400
120	1200	1450	127674	13362

  i.   Calculate and interprate the sample linear correlation coefficient.   (10 marks)

  ii.   Calculate the linear regression equation for the ice cream sales and average monthly
        temperate.   (4 marks)
  iii. What would be the sales if the average temperature were 10°C?   (3 marks)

Question Five
A manufacturer produces drill bits with an intended life of at least 580 hours and a standard
deviation of 30 hours. A quality control scientist draws a sample of 100 bits and finds $\overline{X}$ =577.
Test at α=.05 to see if the machinery needs adjusting by answering the following questions. Note:
At 0.05, the critical Z-score is -1.645

a) State the null and alternative hypotheses.   (4 marks)

b) State your decision criteria.   (4 marks)
c) Calculate your z-score.   (8 marks)
d) Explain your findings.   (2 marks)
e) Make your decision.   (2 marks)