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**TECHNICAL UNIVERSITY OF KENYA**

**FACULTY OF APPLIED SCIENCES AND TECHNOLOGY**

**SCHOOL OF COMPUTING & INFORMATION TECHNOLOGY**

**END OF SEMESTER EXAMINATION SERIES**

**FIRST SEMESTER EXAMINATIONS 2017/2018**

**SECOND YEAR EXAMINATIONS FOR THE DEGREE OF**

**BACHELOR OF TECHNOLOGY IN COMPUTER TECHNOLOGY**

**BACHELOR OF TECHNOLOGY IN INFORMATION TECHNOLOGY**

**BACHELOR OF TECHNOLOGY IN COMPUTER NETWORK TECHNOLOGY**

**ECSI 2201/ ECCI 2201/ ECII 2201 PROBABILITY AND STATISTICS**

TIME: 2 Hours

**Instructions to candidates:**

This paper consists of FIVE Questions.

Answer Question ONE [30 Marks] and any other TWO Questions [20 Marks Each].

Write your college number on the answer sheet.

This paper consists of 3 printed pages

**Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.**

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**QUESTION ONE (30 MARKS) COMPULSORY**

1. Define the following term
2. Sample space
3. Outlier
4. Discrete random variable
5. Ordinal data

(8 Mks)

1. Given the following data, determine the mean, mode, median, range and inter quartile deviation.

29, 32, 35, 31, 33, 29, 26, 28, 33, 27 (6 Mks)

c) With the aid of diagrams state and explain clearly the following terms

i) Kurtosis

ii) Skewness (4 Mks)

d) Explain clearly the importance of probability and statistics for a computer scientist. (4 Mks)

e) The probability of getting a head when a biased coin is tossed is 0.6. If the coin is tossed 6 times, find the probability of getting less than four head.

(4 Mks)

f) )The coefficient of rank correlation between marks in English and maths obtained by a group of students is 0.8. If the sum of the squares of the difference in ranks is given to be 33, find the number of students in the group. . (4 Mks)

**QUESTION TWO (20 MARKS)**

**a)** Define the following terms

i) Correlation

ii) Regression

iii) Coefficient of determination (3 Mks)

b) Given the normal equations: and , Show that

-b and b = (4 Mks)

c) The following data was collected by Karl Pearson to investigate the relationship between fathers’ and sons’ height measured in inches.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Father’s height | 60 | 62 | 64 | 65 | 66 | 67 | 68 | 70 | 72 | 74 |
| Son’s height | 63.6 | 65.2 | 66 | 65.5 | 66.8 | 67.1 | 67.4 | 68.3 | 70.1 | 70 |

1. Identify the dependent and independent variables (2 Mks)
2. Draw a scatter and comment on the relationship (3 Mks)
3. Calculate the Pearsonian correlation coefficient (4 Mks)
4. Find the regression equation and fit it in ii) above.cz ( 4 Mks)

**QUESTION THREE (20 MARKS)**

1. The data below represent the mass of 30 girls

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Mass(kg) | 41-45 | 46-50 | 51-55 | 56-60 | 61-65 |
| Frequency | 2 | 6 | 10 | 6 | 6 |

Using an assumed mean of 53kg, determine

1. the mean mass of the girls
2. the standard deviation
3. Calculate the median (10 Mks)
4. The table below gives the heights ( in cm) for 400 children

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Height (cm) | 100-109 | 110-119 | 120-129 | 130-139 | 140-149 | 150-159 | 160-169 |
| Frequency | 27 | 58 | 130 | 105 | 50 | 25 | 5 |

1. Draw a cumulative frequency curve (4Mks)

Use the curve to estimate

1. the median (2 Mks)
2. the interquartile range (4 Mks)

**QUESTION FOUR (20 MARKS)**

a) Differentiate between mutually exclusive events and independent events. (2mks) b) Two fair dice are tossed simultaneously

1. List all the possible outcomes (3mks)
2. Find the probability that the sum of the two dice is greater than six. (2mks)
3. Given that the first die is a three, find the probability that the sum of the two die is a six or more. (3mks)

c) The average number of calls per hour in a certain office is 20. Calculate the probability that there will be exactly 10 calls in 2 hrs. (5mks)

d) Every day, the number of network blackouts has a distribution (probability

mass function)

|  |  |  |  |
| --- | --- | --- | --- |
| X | 0 | 1 | 2 |
| P(X) | 0.7 | 0.2 | 0.1 |

A small internet trading company estimates that each network blackout results in a ksh 5000 loss. Compute expectation and variance of this company’s daily loss due to blackouts. (5 Mks)

**QUESTION FIVE (20 MARKS)**

1. i) State the features of the binomial distribution ( 3 Mks)

ii) A quality control engineer tests the quality of produced computers. Suppose that 5% of computers have defects, and defects occur independently of each other.

1. Find the probability of exactly 3 defective computers in a shipment of

twenty.

1. Find the probability that the engineer has to test at least 5 computers in order to find 2 defective ones. (6 Mks)
2. Suppose that the average number of accidents occurring weekly on a

particular stretch of a highway equals 3. Calculate the probability that there are at least three accidents this week. (3 Mks)

c) i) State the features of the normal distribution ( 3 Mks)

ii) Suppose that the average household income in some country is Ksh

15 000, and the standard deviation is ksh 3 000. Assuming the Normal

distribution of incomes, compute the proportion of “the middle

class,” whose income is between ksh 8 000 and ksh 18 000.. (5 Mks)