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**University Examinations 2014/2015**

SECOND YEAR, FIRST EXAMINATION FOR DIPLOMA IN ELECTRICAL ENGINEERING AND DIPLOMA IN CIVIL ENGINEERING

**SMA 0201: ENGINEERING MATHEMATICS III**

**DATE: DECEMBER 2014 TIME: 1**$\frac{1}{2} $**HOURS**

**INSTRUCTIONS:** *Answer question* ***one*** *and any other* ***two*** *questions*

**QUESTION ONE (30 MARKS)**

1. Define the following terms as used in statistics:
2. Type I error (2 marks)
3. Null hypothesis (2 marks)
4. Each of 4 boxes contains 3 electrical bulbs, 2 good and 1 defective. A bulb is chosen at a random from each box. Calculate the probability that:
5. 4 good bulbs will be chosen (3 marks)
6. 2 good and 2 defective bulbs will be chosen (3 marks)
7. What is the expected number of good bulbs (3 marks)
8. Given the data: 66,30,34,60,20,75,42,70,34,69 calculate:
9. Mean (2 marks)
10. Median (2 marks)
11. Variance (2 marks)
12. Let x have a normal distribution with $μ$=10 and $δ$=2. Find the probability that an x value selected at random from this distribution is between 11 and 14. (3 marks)
13. Seven methods of imparting business education were ranked by the MBA students of two universities as follows;

Methods of teaching I II III IV V VI VII

Rank by students of university A 2 1 5 3 4 7 6

Rank by student of university B 1 3 2 4 7 5 6

Calculate rank correlation coefficient and comment on its value (4 marks)

1. State four properties of mean (4 marks)

**QUESTION TWO (15 MARKS)**

A car salesman claims that a particular make of car would give a mileage of greater than 20 miles per litre. To test the claim, a field experiment was conducted where 10 cars were each run on one litre of petrol. The results (in miles) were 23, 18, 22, 19, 19, 22, 18, 18, 24, 22. Do the data collaborate the salesman’s claim? Use $∝$ 0.05 and assume normal distribution for mileage

**QUESTION THREE (15 MARKS)**

Given the data set below

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| x | 10 | 15 | 18 | 1 | 4 | 7 | 14 |
| y | 3 | 2 | 0 | 8 | 6 | 4 | 3 |

Compute:

1. The correlation coefficient (r)
2. Comment on the relationship between x and y
3. Determine and , a and b for the equation y=a+bx
4. Write the prediction equation
5. Estimate y when x=12 and x=19

**QUESTION FOUR (15 MARKS)**

1. As a result of tests on 20,000 electric bulbs manufactured by a company it was found that the lifetime of the bulb was normally distributed with an average life of 2040 hours and standard deviation of 60 hours. On the basis of this information, estimate the number of the bulbs that are expected to burn for:
2. More than 2150 hours (5 marks)
3. Less than 1960 hours (5 marks)
4. If 10% of the tools produced in a certain manufacturing process turn out to be defective, find the probability that in a sample of 10 tools chosen at random, exactly two will be defective by using the poison distribution (5 marks)