

**NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY**

**FACULTY OF INDUSTRIAL TECHNOLOGY**

**DEPARTMENT OF TECHNICAL TEACHER EDUCATION**

**Programme: BACHELOR OF TECHNICAL EDUCATION HONOURS DEGREE**

**MAI N EXAMI NATI ON**

**Course: STATISTICS FOR EDUCATORS**

**TTE3109**

**Part/Year: III**

**JANUARY 2014**

**Time: 3 hours**

**Lecturer: Dr N Phuthi**

**100 marks**

**INFORMATION AND DIRECTIONS TO CANDIDATES**

1. Answer **Question 1** and any **THREE** others.
2. All questions carry equal marks.
3. Begin each question on a fresh page and parts of the same question must be submitted together.
4. A list of selected formulae is provided at the end of the question paper.
5. The use of silent, non-programmable calculators is encouraged unless advised otherwise.
6. Numerical answers should be given to two decimal places unless indicated otherwise.
7. Statistical tables are supplied in a separate booklet.
8. This paper consists of FIVE printed pages.

**QUESTION 1**

Below are the marks obtained by a class of university students in a Mathematics course:

56	64	59	60	68	54	69	59	61	58
62	50	55	65	61	66	56	57	57	63
60	63	62	53	67	52	62	60	64	67
64	61	56	63	58	63	59	67	61	54
53	67	50	64	60	57	64	52	60	64
66	57	62	59	62	56	58	65	59	61
63	56	54	61	51	70	63	53	58	60
57	63	58	65	63	60	54	62	67	59

- (a) Create a frequency table from the data, using a class interval of 3 and starting with the class 50 – 52. [5]
- (b) Draw a cumulative frequency polygon from the data. [10]
- (c) From the polygon, indicate the median mark. [2]
- (d) Estimate the number of students passing if the pass mark was set at 60. [3]
- (e) Find the mean and standard deviation of the above data. [5]

**QUESTION 2**

- (a) State the null hypothesis for each of the following situations:
- (i) A teacher wants to test whether students who come to school early perform better than those who do not.
  - (ii) A university official wishes to determine if grades obtained by students in high school affect their performance at university. [2,2]
- (b) For a sample of 60 taken from a population of 3 500, the sample mean is 85.1 and the sample standard deviation is 15.5. Using the 0.05 level of significance, test the hypothesis that the true population mean is 82. [16]
- (c) Describe 3 properties of a histogram and explain its use in data presentation. [5]

**QUESTION 3**

- (a) State three main differences among the following: mean, mode and median. [6]
- (b) The relationship between a school's revenue collection in \$'000 (X) and the percentage pass rate (Y) in consecutive years is shown in the table below:

Year	2000	2002	2004	2006	2008	2010
X	75	121	87	73	98	104
Y	65	79	71	60	74	73

- (i) Draw the scattergram for the data and insert the best fitting line. [6]
- (ii) Calculate and interpret the product-moment correlation coefficient. [9]
- (iii) Calculate the median and the coefficient of variation of the pass rates. [4]

**QUESTION 4**

- (a) A transport operator worked out how much it cost him to run his fleet for 3 consecutive years starting in 2005. The results were as follows:

YEAR	Insurance (\$)	Maintenance (\$)	Fuel (\$)
2005	480.00	320.00	640.00
2006	624.00	528.00	576.00
2007	700.00	1160.00	732.00

Draw three accurate pie charts to scale to represent this information. [18]

- (b) The data below shows annual percentage increases in employee salaries. Calculate the average percentage increase over the five years. [7]

2005	2006	2007	2008	2009
5%	8.5%	9%	6%	7.5%

**QUESTION 5**

Four 'O' level classes, 4A to 4D, wrote an examination in which the result was Distinction (D), Credit (C), Pass (P) or Fail (F). Of the 36 candidates in class 4A, 1 obtained Distinction, 7 obtained Credit, 8 Pass and 20 Fail. Of the 42 candidates in 4B, 4 obtained Distinction, 10 Credit, and 12 Pass. In 4C, there were 3 Distinctions, 10 credits, 10 passes and 13 Fails. And of the 30 candidates in 4D, 8 got Credit, 12 got Pass, and 5 failed.

Class	Frequency	Distinction	Credit	Pass	Fail	Total
4A	Observed	1	7	8	20	36
	Expected		6			
4B	Observed	4	10	12		42
	Expected					
4C	Observed	3	10	10		
	Expected					
4D	Observed		8	12	5	
	Expected					
Total			24			

- (a) Copy and complete the contingency table above, based on the information. [10]  
 (b) Determine the degrees of freedom (d.f.) in this problem. [2]  
 (c) Construct another table and calculate  $\chi^2$ . [8]  
 (d) From your results, can you conclude that the performances of the four classes in the examination differed significantly from each other? Explain. [5]

**QUESTION 6**

(a) Draw sketches to show the following properties of a normal distribution curve.

- (i) Leptokurtic  
 (ii) Negatively skewed  
 (iii) Area of 0.50 symmetrical about the mean  
 (iv) Mean 250 and standard deviation 35  
 (v) Area within -1 and 2 standard deviations [2,2,2,2,2]

(b) A university student obtained the overall marks shown below in 2 courses.

- (i) Calculate the z-scores and analyse the student's comparative performance in each course. [10]  
 (ii) Draw an appropriate diagram to show the comparison. [5]

Course	STUDENT'S SCORE	TOTAL OUT OF	CLASS AVERAGE	STANDARD DEVIATION
EDC4140	70	100	60	6
EDC4135	73	100	78	15

END OF EXAMINATION QUESTION PAPER