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KIBABII UNIVERSITY

**UNIVERSITY EXAMINATIONS
2017/2018 ACADEMIC YEAR**

**FOURTH YEAR FIRST SEMESTER
MAIN EXAMINATIONS**

FOR THE DEGREE OF BSC (PHYSICS) AND B.ED (SCIENCE)

COURSE CODE: IPT 422

COURSE TITLE: QUALITY RELIABILITY ENGINEERING

DURATION: 2 HOURS

DATE: MONDAY 18TH DECEMBER 2017 **TIME:** 8.00 – 10.00 AM

INSTRUCTIONS TO CANDIDATES

- Answer **QUESTION ONE** (Compulsory) and any other two (2) Questions.
- Indicate **answered questions** on the front cover.
- Start every question on a new page and make sure question's number is written on each page.

This paper consists of 3 printed pages. Please Turn Over



KIBU observes ZERO tolerance to examination cheating

QUESTION ONE (30 MARKS)

- a) i) Define the term 'quality' as used in manufacturing science. (1 mark)
- ii) Explain what is meant by 'quality control' (2 marks)
- iii) State FOUR objectives of quality control in an organization. (2 marks)
- b) i) Explain the principle of prevention as applied to quality control.(3 marks)
- ii) Name the main tools used in statistical quality control (3 marks)
- iii) State six TQM principles (3 marks)
- c) i) What is sampling inspection? (2 marks)
- ii) Explain the characteristics of a normal frequency distribution (5 marks)
- d) i) State FOUR functions of control charts (4 marks)
- ii) Describe the steps for constructing control charts. (5 marks)

QUESTION TWO (20 MARKS)

In the testing of piston pins, 10 samples were taken each of 100 units (sample size).

The number of defectives found were respectively 3,2,3,5,3,3,2,4,3, and 2. Calculate the U.C.L and L.C.L for :

- i) The control charts for fraction defectives.
- ii) The percent defect control chart. (20 marks)

QUESTION THREE (20 MARKS)

- a) i) Define SQC (1¹/₂ marks)
- ii) State THREE advantages of 100% inspection in quality control (4¹/₂ marks)
- b) Past records in a small automobile garage indicate an average of five cars arrive daily. The demand for emergency service at this garage is distributed according to a Poisson distribution. Calculate the probability that exactly 0, 1,2,3,4 and 5 cars will arrive. (7marks)
- c) i) State the uses of process capability analysis (2marks)
- ii) Explain the steps in a complete analysis of process capabilities (5 marks)

QUESTION FOUR (20 MARKS)

- a) Define the term 'reliability' (2 marks)
- b) State the steps in reliability determination (2 marks)

- c) To test the design of a modified clutch for a motor vehicle, MTBF was established at 1600 hrs. The following data was collected:

<u>Name of The parts</u>	<u>Number used (n)</u>	<u>Failure rate per part (λ) (%/1000hrs)</u>	<u>Total part failure rate ($n \lambda$) (%/1000hrs)</u>
V	30	0.4	
W	20	0.35	
X	40	0.24	
Y	50	0.12	
Z	70	0.20	

Determine whether the modified design is perfectly reliable. (10 marks)

- d) Explain THREE techniques that may be used to increase the reliability of a product (6marks)

QUESTION FIVE (20 MARKS)

- a) Differentiate between a single sampling plan and a double sampling plan(3 marks)
- b) i) What is an operating characteristic curve? (2 marks)
 ii) Explain the application of operating characteristics curves. (5 marks)
- c) Differentiate between manufacturer's risk and consumer's risk. (4 marks)
- d) Explain THREE situations in which inspection by attributes is employed. (6 marks)