



The Open University of Sri Lanka
B.Sc/B.Ed. DEGREE, CONTINUING EDUCATION PROGRAMME
Open Book Test 2015/2016
Level 04 Applied Mathematics
APU 2140/APE 5140– Statistical Distribution Theory

Duration: - One hour

Date: - 02-04-2016

Time: - 2.30 p.m. to 3.30 p.m.

Non programmable calculators are permitted. Statistical tables are provided.

Answer all questions.

1.

The probability density function of the life time X of an electronic component in a copier (in hours) is

$$f(x) = \frac{e^{-\frac{x}{1000}}}{1000} ; x > 0$$

Determine:

- (i) the probability that a component lasts more than 300 hours before failure.
- (ii) the probability that a component fails in the interval from 1000 to 2000 hours.
- (iii) the number of hours at which 10% of components have failed.
- (iv) the expected time failure of a randomly selected electronic component.
- (v) the variance of the failure time of a randomly selected electronic component.

2.

In quality control process, a sample of 20 parts from a metal punching process is selected every hour. When the metal punching process is in control, on the average, 1% of the parts require rework. Let X denotes the number of parts in the sample of 20 that require rework.

The metal punching process is stopped for adjustments if $X > a + 3b$, where a and b are the mean and the standard deviation of X , when the process is in control.

- (i) What is the distribution of X ? Clearly state the mass function and the parameters of the distribution.
- (ii) Find the expected number of parts, in the sample that require rework, when process is in control.
- (iii) Find the standard deviation of the number of parts that require rework in the sample when process is in control.
- (iv) Find the probability of punching process being stopped for adjustments when the process is actually in control.
- (v) Find the probability of process not being stopped for adjustments when 2% of the parts require rework.