

**SQC & OR Unit**

**Indian statistical Institute, 8<sup>th</sup> Mile Mysore Road, Bangalore-560059**

**M.S.(Quality Management Science) ( 2019-2020)**

**Semester I-July 2019**

**Supplementary Paper :Reliability, Maintainability and Safety**

**Time: 2 Hours**

**Date: 27 November, 2019**

**Max. Marks: 50**

This paper carries “52” Marks. Answer as many questions as you can but the maximum marks you can score is “50”

1. A sample of two printed circuit boards is selected without replacement from a batch. Describe the ordered sample space for (a) the batch contains 90 boards that are not defective, 8 boards with minor defects and 2 boards with major defects (b) the batch that contains 90 boards that are not defective, 8 boards with minor defects and 1 board with major defects

(3+3=6)

2. Find “k” so that the following can serve as the probability density function of a random variable :

$$\begin{aligned} f(x) &= 0 && \text{for } x \leq 0 \\ &= kxe^{-4x^2} && \text{for } x > 0 \end{aligned}$$

(6)

3. Five defective screws are mixed with 20 good ones. Four screws are drawn at random from this lot. Find the mean and variance of the number of defective screws drawn

(10)

4. Show that mean and variance of Poisson distribution are same

(6)

5. Check whether the statement “The mean of the Binomial Distribution is 5 and Standard deviation is 3” is true or false

(4)

6. If  $B_1, B_2, \dots, B_n$  constitute a partition of the sample space,  $P(B_i) \neq 0$  for  $i = 1, 2, \dots, n$  and  $P(A) \neq 0$ , then

$$P(B_r) = [P(B_r).P(A | B_r)] / \sum [P(B_i).P(A | B_i)] \text{ for } r = 1, 2, \dots, n$$

Prove the above theorem

(8)

7. How many balance coins should be tossed to give the probability of two heads at least 0.99 ?

(6)

8. The odds that a book will be favorably reviewed by three independent critics are 3 to 2, 4 to 3 and 2 to 3 respectively. What is the probability that of the three, majority would be favorable ?

(6)