VIT
Vellore Institute of Technology
(Deemed to be University under section 3 of UGC Act, 1956)

Fall Semester 2019-2020
Continuous Assessment Test – II
Programme Name & Branch: B. Tech.

Course Name & Code: Statistics for Engineers & MAT2001 **Slot: E2+TE2**
Exam Duration: 90 minutes **Maximum Marks: 50**

Answer All the Questions (5 × 10 = 50)
Use of Statistical table is allowed

1. The following sample data were collected to determine the relationship between two processing variable and the current gain of a certain kind of transistor. Fit a regression plane for the given data.

Diffusion time- x_1	1.5	2.5	0.5	1.2	2.6	0.3	2.4	2.0	0.7	1.6
Sheet resistance- x_2	66	87	69	141	93	105	111	78	66	123
Current Gain y	5.3	7.8	7.4	9.8	10.8	9.1	8.1	7.2	6.5	12.6

2. What probability model is appropriate to describe a situation where 100 misprints are distributed randomly throughout the 100 pages of a book? For this model, what is the probability that a page observed at random will contain at least three misprints?

3. a) Car cooling systems are controlled by electrically driven fans. Assuming that the lifetime T in hours of a particular make of fan can be modelled by an exponential distribution with $\lambda = 0.0003$, find the proportion of fans which will give at least 1000 hours service? If the fan is redesigned so that its lifetime may be modelled by an exponential distribution with $\lambda = 0.00035$, would you expect more fans or fewer to give at least 1000 hours service?

   b) The finish times for marathon runners during a race are normally distributed with a mean of 195 minutes and a standard deviation of 25 minutes.
   (i) What is the probability that a runner will complete the marathon within 3 hours?
   (ii) What proportion of the runners will complete the marathon between 3 hours and 4 hours?

4. A salesman in a departmental store claims that at most 60 percent of the shoppers entering the store leaves without making a purchase. A random sample of 50 shoppers showed that 35 of them left without making a purchase. Are these sample results consistent with the claim of the salesman? Also find 98% confidence limits for the Population proportion? (Use a Level of significance of 0.05)

5. A company claims that its light bulbs are superior to those of its main competitor. If a study showed that a sample of 40 of its bulbs had a mean lifetime of 647 hours of continuous use with a standard deviation of 27 hours, while another sample of 40 bulbs by its main competitor had a mean life time of 638 hours of continuous use with a standard deviation of 31 hours, does this substantiate the claim at the 0.01 level of significance?