Use of probability distribution tables and scientific calculator is allowed.

1. A random sample of 1000 persons from Chennai city have an average height of 67 inches and another random sample of 1200 persons from Mumbai city have an average height of 68 inches. Can the samples be regarded that the average height of persons from both cities is equal with a standard deviation of 5 inches? Test at 2% level of significance.   (5)

2. Suppose a basketball player is practicing shooting, and has a probability 0.95 of making each of his shots. Also assume that his shots are independent of one another. Let X be the number of shots made in 100 attempts. What is the probability mass function of X? What is E[X]? Let Y be the number of shots made before the first miss. What is the probability that Y>50?   (5)

3. Two factories, A and B, make radios. The radios from factory A are defective with probability 0.1, while those from factory B are defective with probability 0.05. You buy a radio at the store, which is equally likely to have been made at either factory. Suppose the radio you bought turns out to be defective. Given this knowledge, what is the conditional probability it was made in factory B? You go back to the store to buy another radio, but the store owner tells you that all the radios in stock, including the defective one you previously bought, were made at the same factory, although she does not know which factory it is. Given his knowledge, what is the conditional probability that the second radio will also be defective?   (6)

4. Suppose that $X_1, X_2,....,X_n,...$ is a sequence of independent identically distributed random variables with mean 1 and variance 1600, and assume that these variables are non-negative: $P(X \geq 0) = 1$. Let Y be the sum of the first 100 variables: $Y =\sum_{i=1} X_i$. What does Markov's inequality tell about the probability $P(Y \geq 900)$? Use the central limit theorem to approximate the probability $P(Y \geq 900)$?   (6)

5. An electronic scale in an automated filling operation stops the manufacturing line after three underweight packages are detected. Suppose that the probability of an underweight package is 0.001 and each fill is independent. What is the mean number of fills before the line is stopped? What is the standard deviation of the number of fills before the line is stopped?   (6)

6. The sales of milk from a milk booth are varying from day-to-day. A sample of one-week sales (Number of Liters) is observed as follows.

Day:	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Sales:	154	145	152	140	135	165	173

   Examine whether the sales of milk are same over the entire week at 1% level of significance.   (6)

7. The following data denotes the life of electric bulbs of four varieties. Test, Whether the average life of four varieties of bulbs is homogenous at 5% level of significance   (6)

Variety	Sample size	Life of the electric bulbs in hours								
I	8	1560	1670	1580	1650	1640	1680	1600	1650	
II	9	1450	1460	1480	1450	1460	1440	1450	1480	1470
III	9	1430	1440	1450	1440	1430	1420	1410	1450	1470
IV	8	1540	1570	1550	1560	1570	1580	1530	1590	