ITM(SLS) BARODA UNIVERSITY, VADODARA

# School of Computer Science Engineering & Technology

## (B.Tech. SEM-VII)

## Probability and Statistical Modelling for Computer Science

## ASSIGNMENT-4

**Part-A**

**Theory Questions**

1. Explain the hypothesis with types.
2. Explain the procedure of the hypothesis testing.
3. Type-I and Type-II error

**Part -B**

1. Individual filing of income tax returns prior to 30 June had an average refund of Rs 1200. Consider the population of 'last minute' filers who file their returns during the last week of June. For a random sample of 400 individuals who filed a return between 25 and 30 June, the sample mean refund was Rs 1054 and the sample standard deviation was Rs 1600. Using 5 percent level of significance, test the belief that the individuals who wait until the last week of June to file their returns to get a higher refund than early the filers.
2. A continuous manufacturing process of steel rods is said to be in a 'state of control' and produces acceptable rods if the mean diameter of all rods produced is 2 inches. Although the process standard deviation exhibits stability over time with standard deviation, $\sigma = 0.01$ inch. The process mean may vary due to operator error or problems of process adjustment. Periodically, random samples of 100 rods are selected to determine whether the process is producing acceptable rods. If the result of a test indicates that the process is out of control, it is stopped and the source of trouble is sought. Otherwise, it is allowed to continue operating. A random sample of 100 rods is selected resulting in a mean of 2.1 inches. Test the hypothesis to determine whether the process be continued.
3. An ambulance service claims that it takes, on A fertilizer mixing machine is set to give 12 kg of nitrate for every 100 kg of fertilizer. Ten bags of 100 kg each are examined. The percentage of nitrate so obtained is: 11, 14, 13, 12, 13, 12, 13, 14, 11, and 12. Is there reason to believe that the machine is defective average 8.9 minutes to reach its destination in emergency calls. To check on this claim, the agency which licenses ambulance services has then timed on 50 emergency calls, getting a mean of 9.3 minutes with a standard deviation of 1.8 minutes. Does this constitute evidence that the figure claimed is too low at the 1 percent significance level?

4. The average breaking strength of steel rods is specified to be 18.5 thousand kg. For this a sample of 14 rods was tested. The mean and standard deviation obtained were 17.85 and 1.955, respectively. Test the significance of the deviation.
5. Two hundred randomly selected adults were asked whether TV shows as a whole are primarily entertaining, educational, or a waste of time (only one answer could be chosen). The respondents were categorized by gender. Their responses are given in the following table:

| | *Opinion* | | | |
|---|---|---|---|---|
| *Gender* | *Entertaining* | *Educational* | *Waste of time* | *Total* |
| Female | 52 | 28 | 30 | 110 |
| Male | 28 | 12 | 50 | 90 |
| Total | 80 | 40 | 80 | 200 |

Is this evidence convincing that there is a relationship between gender and opinion in the population interest?