PRN No.	Total No. of Questions: 06
RBT23IT006	

QP Code:

JSPM's

Rajarshi Shahu College of Engineering, Tathawade, Pune- 411033

(An autonomous institute affiliated to Savitribai Phule Pune University)

Examination: Mid Semester Examinations (MSE)

Semester: II **Academic Year: 2023-24**

Class: F. Y. B. Tech. (Comp/IT/CSBS)

Department: Engineering Sciences and Humanities

Subject Code: ES1205

Subject Name and Pattern: Statistical Methods (2023 Pattern)

Duration: 1 Hour **Max. Marks: 30 Marks**

Instructions to the Candidates

1. Solve Q.1or Q.2 Q.3 or Q.4 and Q.5 or Q.6.
2. Assume suitable and necessary data wherever required.
3. Neat diagram must be drawn wherever necessary.

Q. No.			Marks	BL	CO
1	a	In the cereal-filling, a sample of 25 cereal boxes from a filling process with grams. Suppose that 2,000 boxes (i.e., the population) are filled on this particular day with mean 368 and standard deviation 15. What is the probability that the sample mean is below 365 grams? [Given: $Area(Z = 1) = 0.3413$]	5	BL3	CO1
	b	The election results showed that a certain candidate received 65 % of the votes. Find the probability that two random samples each consist of 200 voters, indicating a greater than 10% difference in the proportions that voted for the candidate. (Given: $Area(Z = 2.04) = 0.4793$)	5	BL3	CO1
		OR			
2	a	Suppose 7% of all households have no home telephone but depends completely on cell phones. Find the probability that in a random sample of 450 households, between 25 and 35 will have no home telephone. You may assume that the normal distribution applies. [Given : $Area\ (Z = 1.29) = 0.4015$ and $Area\ (Z = 0.74) = 0.2704$].	5	BL3	CO1
	b	The electrical light bulbs of manufacturer A have a mean lifetime of 1400 hours with standard deviation of 200 hours, while those of manufacturer B have a mean life time of 1200 hours with a standard deviation of 100 hours. If random samples of 125 bulbs of each brand are tested, what is the probability that the brand A bulbs will have a mean life time that is at least 250 hours more than the brand B bulbs? (Given: $rea(Z = 2.5) = 0.4938$).	5	BL3	CO1

3 a In measuring time, a psychologist estimates that the standard deviation is 0.05 second. How large a sample of measurements must be taken in order to be (a) 95 % (b) 99 % confident that the error in his estimate of mean reaction time will not exceed 0.01 second. 5 BL3 CO2

Confidence level	95%	99 %
Critical value	1.96	2.58

b Let $X_1, X_2,...,X_n$ be a random sample of Binomial distribution with n trials with probability mass function . Find maximum likelihood function of parameter p when single sample point is taken. 5 BL3 CO2

OR

4 a A sample of 100 voters chosen at random from all votes in a particular city indicated that 55 % of them were in favour of particular candidates. Find (a) 95 % (b) 99 % confidence limit for the proportion of all the voters in favour of this candidate. 5 BL3 CO2

Confidence level	95%	99 %
Critical value	1.96	2.58

b Let $X_1, X_2,...,X_n$ denote a random sample from a Poisson distribution with parameter $\lambda > 0$. Find a sufficient statistic for the parameter λ by Neyman Factorization theorem 5 BL3 CO2

5 a The mean breaking strength of the cable supplied by a manufacturer is 1800 with standard deviation of 100. By a new technique in the manufacturing process, it is claimed that, the breaking strength of the cable has increased. To test this claim, a sample of 50 cables are tested and it is found that the mean breaking strength is 1850. Can we support the claim at 1 % LoS. Given, $Z_\alpha = 2.33$. 5 BL3 CO3

b Before an increase GST on Tea, 800 people out of a sample of 1000 were consumers of Tea. After an increase GST, 800 people were consumers of Tea in a sample of 1200 persons. Find, whether there is a significant decrease in the consumption of Tea, after the increase in GST. Test for 1 % LoS. Given, $Z_\alpha = 2.33$. 5 BL3 CO3

OR

6 a The fatality rate of typhoid patient's is believed to be 17.26 % . In a certain year, 640 patients suffering from typhoid were treated in a metropolitan hospital and only 63 patients died. Can we consider the hospital is efficient ? Test for 1 % LoS. Given, $Z_\alpha = -2.33$. 5 BL3 CO3

b Test the significance of the difference between the means of the samples , drawn from two populations with standard deviation using table 5 BL3 CO3

Sample	Size	Mean	Standard deviation
Sample 1	100	61	4
Sample 2	200	63	6

Test at 5 % LoS. Given, $Z_\alpha = 1.96$.

*****