

GUJARAT TECHNOLOGICAL UNIVERSITY
MCA - SEMESTER-III • EXAMINATION – WINTER 2015

Subject Code: 2630003

Date: 29/12/ 2015

Subject Name: Statistical Methods (SM)

Time: 10.30 to 1.00

Total Marks: 70

Instructions:

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks. .
4. Statistical tables for various distributions are permitted to be used.

- Q.1 (a)** State whether the following statements are TRUE or FALSE. Justify your answer. 7
1. Diagrammatic representation of the simple frequency distribution is Ogive.
 2. Standard deviation of one observation is 1.
 3. Coefficient of determination is $1 - r^2$.
 4. The probability that the throw of two dice yields a total of 5 or 6 is $5/18$.
 5. The standard deviation of binomial distribution is npq .
 6. As the sample size increases, standard error also increases.
 7. Null hypothesis is not tested but alternative hypothesis is tested.
- (b)** Bharat Ltd. manufactures blades of which one fifth percentage turn out to be defective. The blades are packed in cases each containing 1000 blades. A wholesaler purchases 2000 such cases. In how many of them he may expect to have:
- a) no defectives 1
 - b) at least two defectives 3
 - c) at the most two defectives 3
- Q.2 (a)** The wages of the workers are normally distributed. 67% of the workers get more than Rs 600 and 69.5% of the workers get less than Rs 790. Find the mean and standard deviation of the distribution. 7
- (b)** From the following data, calculate the number of pairs of X and Y variables: 7
 $\sum xy = 112, \sigma^2 y = 64, \sum x^2 = 245, r = 0.4$
- OR**
- (b)** 1000 light bulbs with a mean life of 120 days are installed in a new factory, their length of life is normally distributed with standard deviation 20 days.
- (i) How many bulbs will expire in less than 90 days? 4
 - (ii) If it is decided to replace all the bulbs together, what interval should be allowed between replacements if not more than 10 per cent should expire before replacement? 3
- Q.3 (a)** If X is a Poisson variable such that $P(X=2) = 9 P(X=4) + 90 P(X=6)$, find the mean and variance of X. 7
- (b)** Define
- i) Type I and Type II errors. 4
 - ii) Two-tailed and One-tailed tests 3

OR

- Q.3 (a)** In a certain city 250 men in a sample of 1000 were found to be smokers. In another city, the number of smokers was 750 in a random sample of 2000. Does this indicate that there is a greater proportion of smokers in the second city than in the first? 7
- (b)** Using given marks of 8 students in a sample, compute mean, median, mode, standard deviation and coefficient of variation. 7
Marks: 93, 65, 80, 97, 85, 87, 97, 60

- Q.4 (a)** A pharma company hypothesizes that the effect of a certain sedative is 13 hrs with a known standard deviation of 2 hrs. From a sample of 16 patients, it is found that the sample mean to be 12 hrs. At 0.01 level of significance, should the company conclude that the average effect of the sedative is less than or equal to 13 hrs. 7
- (b)** In a survey of 200 girls of which 40% were intelligent, 30% had uneducated fathers, while 20% of the unintelligent girls had educated fathers. 7

	Intelligent girls	Unintelligent girls	Row total
Educated fathers	56	24	80
Uneducated fathers	24	96	120
Column total	80	120	200

Do these figures support the hypothesis that educated fathers have intelligent girls? Test at 5% level of significance.

OR

- Q.4 (a)** A simple random sample of size 100 has mean 15, the population variance being 25. Find an interval estimate of the population mean with a confidence level of (i) 99% and (ii) 95% 7
- (b)** The number of car accidents in a metropolitan city was found as 20, 17, 12, 6, 7, 15, 8, 5, 16 and 14 per month respectively. Use chi-square test to check whether these frequencies are in agreement with the belief that occurrence of accidents was the same during the 10 months period. Test at 5% level of significance. 7

- Q.5 (a)** A random sample of 160 people is taken and 120 were in favor of liberalizing licensing regulations. With 95% confidence, what proportion of all people are in favor? (z value with 95% confidence for two tailed test is 1.96). 7
- (b)** The following data relate to advertising expenditure and sales.

Advertising expenditure	1	2	3	4	5
Sales (Rs. Lakhs)	10	20	30	50	40

- a) Find out regression equation. 3
b) Find SSE, SST & SSR. 2
c) Find r^2 . 2

OR

- Q.5 (a)** Write the Characteristics of the Normal Distribution 7
- (b)** A husband and wife appear in an interview for two vacancies in the same post. The probability of husband's selection is $\frac{4}{5}$ and that of wife's selection is $\frac{3}{5}$. What is the probability that
- I. Both of them will be selected. 3
II. Only one of them will be selected. 4
