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Question Paper Code : 10191

M.B.A. DEGREE EXAMINATIONS, APRIL/MAY 2023.

First Semester

BA 4101 – STATISTICS FOR MANAGEMENT

(Regulations 2021)

Time : Three hours   Maximum : 100 marks

Approved Table may be permitted.

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define conditional probability.

2. What is a Binomial Experiment?

3. What is estimation?

4. State central limit theorem.

5. What is a null hypothesis?

6. What is Type I error?

7. What are the advantages of non - parametric tests?

8. When do you use a chi square test?

9. What is a regression model?

10. What is a random error in a regression equation?

PART B — (5 × 13 = 65 marks)

11. (a) In a bolt factory machines A, B and C manufacture respectively 25%, 35% and 40% of the total. Of their output, 5%, 4% and 2% are defective bolts. A bolt is drawn at random and found to be defective, What is the probability that it was manufactured by machine C?

Or

(b) Hupper Corporation produces many types of soft drinks, including Orange Cola. The filling machines are adjusted to pour 12 ounces of soda into each 12-ounce can of Orange Cola. However, the actual amount of soda poured into each can is not exactly 12 ounces; it varies from can to can. It has been observed that the net amount of soda in such a can has a normal distribution with a mean of 12 ounces and a standard deviation of 0.015 ounce. (i) What is the probability that a randomly selected can of Orange Cola contains 11.97 to 11.99 ounces of soda? (ii) What percentage of the Orange Cola cans contain 12.02 to 12.07 ounces of soda?

12. (a) A publishing company has just published a new college textbook. Before the company decides the price at which to sell this textbook, it wants to know the average price of all such textbooks in the market. The research department at the company took a sample of 36 comparable textbooks and collected information on their prices. This information produced a mean price of Rs.145 for this sample. It is known that the standard deviation of the prices of all such textbooks is Rs.35 and the population of such prices is normal. (i) What is the point estimate of the mean price of all such college textbooks? (ii) What is the margin of error at 90% confidence interval. (iii) Construct a 90% confidence interval for the mean price of all such college textbooks.

Or

(b) According to a survey conducted by Pew Research Center in June 2009, 44% of people aged 18 to 29 years said that religion is very important to them. Suppose this result is based on a sample of 1000 people aged 18 to 29 years. (i) What is the point estimate of the corresponding population proportion? (ii) What is the margin of error at 99% confidence level. (iii) Find, with a 99% confidence level, the percentage of all people aged 18 to 29 years who will say that religion is very important to them.

13. (a) A test was given to students of two groups A and B to test whether there is any difference in the learning ability. Sixteen students of Group A took the test and their average score was found to be 55.8 with the standard deviation of 5.7. Nine students of Group B took the test and their average score was found to be 59.3 with the standard deviation of 4.3. At 5% significance level, can you conclude that the learning ability of the students of Group A and B are different? Assume that the population standard deviations are equal.

Or

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(b) To test the significance of variation in the retail prices of a commodity in 3 cities, Mumbai, Kolkata and Delhi, 4 shops were chosen at random in each city and the prices are given as follows.

Mumbai :   16   8   12   14

Kolkata :   14   10   10   6

Delhi :   4   10   8   8

Are the prices in these cities different. Assume that the population is normally distributed with equal variance and the data collected randomly.

14. (a) A college administration is interested in checking whether the application for admission arrive randomly with respect to the gender. The gender of 25 consecutively arriving application were found to arrive in the following order, where M denotes a male applicant and F denotes a female applicant.

M,F,M,M,F,F,F,M,F,M,M,M,F,F,F,F,M,M,M,F,F,M,F,M,M

Can you conclude that the applications for admission arrive randomly with respect to gender at 95% confidence level?

Or

(b) A dairy agent wants to test a hormone that may increase cow's milk production. Some members of the group fear that the hormone could actually decrease production. So a matched pairs test is arranged. 30 cows were given the hormone and their milk production is recorded for 4 weeks. Each of these 30 cows is matched with another cow of similar size, age and prior record of milk production. This second group of 30 cows do not receive the hormone. The milk production of these cows were recorded for the same period of time. In the 19 of these 30 pairs, the cow taking the hormone produced more milk, in 9 of the pairs, the cow taking the hormone produced less and in 2 of the pairs, there was no difference. Using 5% level of significance, can you conclude that the hormone changes the median milk production of such cows?

15. (a) The following table gives indices of industrial production and the number of unemployed people in a state in lakhs. Check whether industrial production and the number of unemployed people are related by computing the correlation coefficient.

Index of Production :   100   102   105   107   105   112   103   99

Number Unemployed :   15   12   13   11   12   12   19   26

Or

(b) Find the line of best fit for the following data. AD indicates cost of advertisement and SR indicates Sales Revenue. Calculate the error of estimate.

AD	21	22	23	24	22	20	20	21	22	25
SR	115	125	120	133	142	150	155	135	125	120

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PART C — (1 × 15 = 15 marks)

16. (a) Connie Rodrigues, the Dean at Midstate College is wondering about the grade distributions at the school. She has heard that the GPAs in Business School are about 0.25 lower than those in college of Arts and Science. A quick random sampling produced the following GPAs.

Business   2.86 2.77 3.18 2.8 3.14 2.87 3.19 3.24

Arts and Science 3.35 3.32 3.36 3.63 3.41 3.37 3.45 3.43

Business   2.91 3 2.83

Arts and Science 3.44 3.17 3.26 3.18 3.41

Assuming that the corresponding populations are normally distributed, do these data indicate that there is a factual basis for the grumblings? State and test the appropriate hypothesis at 98% confidence level.

Or

(b) A brand manager is concerned that her brand's share may be unevenly distributed throughout the country. In a survey in which the country was divided into 4 geographic regions, a random sampling of 100 consumers in each region was surveyed with the following results. In the North East region, 40 purchased the brand and the rest did not purchase. In the North West region, 55 purchased the brand and the rest did not purchase. In the South East region, 45 purchased the brand and the rest did not purchase. In the South West region, 50 purchased the brand and the rest did not purchase. At $\alpha = 0.05$, Use Chi Square test to check whether the brand share is the same across the four regions.

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