Reg. No. :

Question Paper Code : 30076

M.B.A. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2022.

First Semester

BA 4101 – STATISTICS FOR MANAGEMENT

(Regulations 2021)

Time : Three hours   Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. State the Baye's theorem.

2. Find $p(x = 2)$ if $\lambda = 5.2$ for a Poisson distribution.

3. List the two properties of sampling distribution of the mean when the population is normally distributed.

4. What are the applications of central limit theorem?

5. Define Type I and Type II errors.

6. What are the five steps of a test of hypothesis using the critical value approach?

7. Define Kolmogorov-Smirnov Test. Write its advantages.

8. Explain the chi-square distribution. What is the parameter of such a distribution?

9. Distinguish between correlation and regression.

10. What do you mean by standard error of estimate? Write its equation.

PART B — (5 × 13 = 65 marks)

11. (a) A statistical experiment has 11 equally likely outcomes that are denoted by $a, b, c, d, e, f, g, h, i, j$ and k. Consider three events : $A = \{b, d, e, f\}$, $B = \{a, c, f, j\}$ and $C = \{c, g, k\}$.

     (i)   Are events A and B independent events? What about events A and C?

     (ii) Are events A and B mutually exclusive events? What about B and C?

     (iii) What are the complements of events A, B and C respectively? What are their probabilities?

Or

     (b) At the Express House Delivery Service, Providing high quality service to customers is the top priority of the management. The company guarantees a refund of all charges if a package it is delivering does not arrive at its destination by the specified time. It is known that from past data, 2% of the packages mailed through this company do not arrive at their destinations within the specified time. Suppose a corporation mails 10 packages through Express House Delivery Service on a certain day.

     (i)   Find the probability that exactly one of these 10 packages will not arrive at its destination within the specified time.

     (ii) Find the probability that atmost one of these 10 packages will not arrive at its destination within the specified time.

12. (a) (i) In a sample of 25 observations from a normal distribution with mean 98.6 and standard deviation 17.2

              (1) What is $P(92 < \bar{x} < 102)$?

              (2) Find the corresponding probability given a sample of 36. (7)

          (ii) It is said that happy and healthy workers are efficient and productive. A company that manufactures exercising machines wanted to know the percentage of large companies that provide on-site health club facilities. A random sample of 240 such companies showed that 96 of them provide such facilities on site.

              (1) What is the point estimate of the percentage of all such companies that provide such facilities on site?

              (2) Construct a 97% confidence interval for the percentage of all such companies that provide such facilities on site. What is the margin error for this estimate? (6)

Or

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(b) (i) In a large city, 88% of the cases of car burglar alarms that go off are false. Let $\bar{p}$ be the proportion of false alarms in a random sample of 80 cases of car burglar alarms that go off in this city. Calculate the mean and standard deviation of $\bar{p}$, also describe the shape of its sampling distribution.   (6)

(ii) Suppose a total of 789,654 families live in a particular city and 563,282 of them own homes. A sample of 240 families is selected from this city, 158 of them own homes. Find the proportion of families who own homes in the population and in the sample.   (7)

13. (a) Two independent samples of observations were collected. For the first sample of 60 elements, the mean was 86 and the standard deviation 6. The second sample of 75 elements had a mean of 82 and a standard deviation of 9.

Compute the estimated standard error of the difference between the two means.

Using $\alpha = 0.01$, test whether the two samples can reasonably be considered to have come from populations with the same mean.

Or

(b) Given a sample mean 83, a sample standard deviation of 12.5 and a sample size of 22, test the hypothesis that the value of the population mean is 70 against the alternative that it is more than 70. Use the 0.025 level of significance.

14. (a) Fit a Poisson distribution for the following distribution and also test the goodness of fit.

$$x:\quad 0\quad 1\quad 2\quad 3\quad 4\quad 5$$
$$f:\quad 142\quad 156\quad 69\quad 27\quad 5\quad 1$$

Or

(b) Use Kruskal-Wallis test to test the difference in mean among the three samples.

Sample 1 : 99   64   101   85   79   88   97   95   90   100
Sample 2 : 83   102   125   61   91   96   94   89   93   75
Sample 3 : 89   98   56   105   87   90   87   101   76   89

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