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Question Paper Code : 40331

M.B.A. DEGREE EXAMINATION, MAY/JUNE 2016

First Semester

BA 7102 – STATISTICS FOR MANAGEMENT

(Regulations 2013)

(Statistical table can be provided)

Time : Three Hours   Maximum : 100 Marks

Answer ALL questions.

PART – A (10 × 2 = 20 Marks)

1. If A and B are independent events then prove that A and $\bar{B}$ are independent events.

2. Find the expected value of binomial distribution.

3. In a sample of 25 observations from a normal distribution with mean 98.6 and standard deviation 17.2, what is $P[92 < \bar{X} < 102]$?

4. Define the following terms :
    Parameters, Statistic, Sampling error and Standard Error.

5. What is the relationship between tests of Hypothesis and confidence intervals ?

6. Which test statistic is used to test the hypothesis $H_o : \sigma^2 = \sigma_0^2; H_1 : \sigma^2 \neq \sigma_0^2$?

7. When we use the Mann-Whitney U-test ?

8. What are the advantages of non parametric methods ?

9. What are the uses of time-series analyses ?

10. Prove that correlation coefficient is the geometric mean of slopes of two lines of regression.

PART – B (5 × 13 = 65 Marks)

11. (a) A doctor has decided to prescribe two new drugs to 200 heart patients as follows : 50 get drug A, 50 get drug B and 100 get both. The 200 patients were chosen so that each had an 80% chance of having a heart attack if given neither drug. Drug A reduces the probability of a heart attack by 35 percent, drug B reduces the probability by 20 percent and the two drugs, when taken together, work independently. If a randomly selected patient in the program has a heart attack, what is the probability that the patient was given both drugs ?

OR

(b) Suppose that we are investigating the safety of a dangerous intersection. Past police records indicate a mean of five accidents per month at this intersection. The number of accidents is distributed according to a Poisson distribution. We will take action to improve the intersection if the probability or more than three accidents per month exceeds 0.65. Should we act ?

12. (a) Using the following sample data, find merit estimates of the mean and the variance of the population.

Sample Data :

101, 105, 97, 93, 114 103, 100, 100, 98, 97, 112, 97, 110, 106, 110, 102, 107, 106, 100, 102, 98, 93, 110, 112, 98, 97, 94, 103, 105, 112, 93, 97, 99, 100, 99

OR

(b) (i) Seven homemakers were randomly sampled and it was determined that the distances they walked in their housework had an average of 39.2 miles per week and a sample standard deviation of 3.2 miles per week. Construct a 95 percent confidence interval for the population mean. (6)

(ii) A speed-reading course guarantees a certain reading rate increase within 2 days. The teacher knows a few people will not be able to achieve this increase, so before stating the guaranteed percentage of people who achieve the reading rate increase, he wants to be 98 percent confident that the percentage has been estimated to within ± 5 percent of the true value. What is the most conservative sample size needed in this problem ? (7)

13. (a) The mean height of 50 male students who showed above average participation in college athletics was 68.2 inches with a standard deviation of 2.5 inches, while 50 male students who showed no interest in such participation had a mean height of 67.5 inches with a standard deviation of 2.8 inches. Test the hypothesis that male student who participate in college athletics are taller than other male students.

OR

(b) The intelligence quotients (IQs) of 16 students from one area of a city showed a mean of 107 and a standard deviation of 10, while the IQs of 14 students from another area of the city showed a mean of 112 and a standard deviation of 8. Is there a significant difference between the IQs of the two groups at 0.01 level of significance ?

14. (a) A survey of 320 families with 5 children revealed the distribution shown in table. Is the result consistent with the hypothesis that male and female births are equally probable ? Use 5% level of significance to test the hypothesis.

Table

Number of boys	5	4	3	2	1	0
Number of families	18	56	110	88	40	8

OR

(b) A company wishes to purchase one of five different machines : A, B, C, D or E. In an experiment designed to determine whether there is a performance difference between the machines five experienced operators each work on the machines for equal times. The following table shows the number of units produced by each machine. Test the hypothesis that there is no difference between the machines at the 0.05 significance level by using the Kruskal-Wallis test.

Operators

Table						
	A	68	72	77	42	53
	B	72	53	63	53	48
Table	C	60	82	64	75	72
	D	48	61	57	64	50
	E	64	65	70	68	53

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15. (a) Calculate the sample coefficient of determination for the data given below :

Sales (units) :   33   38   24   61   52   45   65   82   29   63   50   79

No. of sections :   3   7   6   6   10   12   12   13   12   13   14   15

OR

(b) The following table describes the number of faculty-owned personal computers of the University of Ohio from 1990 to 1995. Develop a second degree estimating equation that best describes these data.

Year :	1990	1991	1992	1993	1994	1995
Number of PCs :	50	110	350	1020	1950	3710

PART – C (1 × 15 = 15 Marks)

16. (a) A research company has designed three different systems to clear up oil spills. The following table contains the results, measured by how much surface area (in square metres) is cleared in 1 hour. The data were found by testing each method in several trials. Are the three systems equally effective ? Use the 0.05 level of significance.

System A :   55   60   63   56   59   55

System B :   57   53   64   49   62

System C :   66   52   61   57

OR

(b) The following table shows the yields per acre of four different plant crops grown on lots treated with three different types of fertilizer. Determine at the 0.05 significance level whether there is a difference in yield per acre

(i)   due to the fertilizers and

(ii)   due to the crops

Table	Crop I	Crop II	Crop III	Crop IV
Fertilizer A	4.5	6.4	7.2	6.7
Fertilizer B	8.8	7.8	9.6	7.0
Fertilizer C	5.9	6.8	5.7	5.2

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