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## Question Paper Code : 80312

M.B.A. DEGREE EXAMINATION, JANUARY 2014.

First Semester

BA 7102 — STATISTICS FOR MANAGEMENT

(Regulation 2013)

Time : Three hours                                          Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1.   Give two examples for categorical variables.

2.   What is a random variable?

3.   Why does sampling introduce errors in research studies?

4.   State the central limit theorem.

5.   Define a hypothesis.

6.   Distinguish between parametric and non parametric tests.

7.   Name two non parametric tests of association.

8.   Distinguish between Mann Whitney test and Kruskal Walis tests.

9.   Distinguish between seasonal variations and cyclical variations in a time series data.

10.  What is nonsense correlation?

PART B — (5 × 16 = 80 marks)

11.  (a)   The ages of a sample of 8 faculty members selected from the School of Business Administration are shown below.

| Faculty | Age |
| --- | --- |
| 1 | 42 |
| 2 | 30 |
| 3 | 73 |
| 4 | 50 |
| 5 | 51 |
| 6 | 37 |
| 7 | 42 |
| 8 | 59 |

(i) Compute the average age. (3)

(ii) Determine the mode. (3)

(iii) Compute the median age. (4)

(iv) Compute the standard deviation. (6)

Or

(b) The sales records of a real estate agency show the following sales over the past 200 days:

| Number of Houses Sold | Number of Days |
|---|---|
| 0 | 60 |
| 1 | 80 |
| 2 | 40 |
| 3 | 16 |
| 4 | 4 |

(i) How many sample points are there? (2)

(ii) Assign probabilities to the sample points and show their values. (2)

(iii) What is the probability that the agency will not sell any houses in a given day? (3)

(iv) What is the probability of selling at least 2 houses? (3)

(v) What is the probability of selling 1 or 2 houses? (3)

(vi) What is the probability of selling less than 3 houses? (3)

12. (a) Below you are given the values obtained from a random sample of 4 observations taken from an infinite population.

32   34   35   39

(i) Find a point estimate for $\mu$. Is this an unbiased estimate of $\mu$? Explain. (4)

(ii) Find a point estimate for $\sigma^2$. Is this an unbiased estimate of $\sigma^2$ Explain. (4)

(iii) Find a point estimate for $\sigma$. (4)

(iv) What can be said about the sampling distribution of $\bar{x}$? Be sure to discuss the expected value, the standard deviation, and the shape of the sampling distribution of $\bar{x}$? (4)

Or

(b) A local health center noted that in a sample of 400 patients 80 were referred to them by the local hospital.

(i) Provide a 95% confidence interval for all the patients who are referred to the health center by the hospital. (8)

(ii) What size sample would be required to estimate the proportion of hospital referrals with a margin of error of 0.04 or less at 95% confidence? (8)

13. (a) A lathe is set to cut bars of steel into lengths of 6 centimeters. The lathe is considered to be in perfect adjustment if the average length of the bars it cuts is 6 centimeters. A sample of 121 bars is selected randomly and measured. It is determined that the average length of the bars in the sample is 6.08 centimeters with a standard deviation of 0.44 centimeters.

     (i) Formulate the hypotheses to determine whether or not the lathe is in perfect adjustment. (6)

     (ii) Compute the test statistic. (6)

     (iii) What is your conclusion? (4)

Or

(b) The daily production rates for a sample of factory workers before and after a training program are shown below. Let d = After - Before.

| Worker | Before | After |
|--------|--------|-------|
| 1 | 6 | 9 |
| 2 | 10 | 12 |
| 3 | 9 | 10 |
| 4 | 8 | 11 |
| 5 | 7 | 9 |

We want to determine if the training program was effective.

     (i) Give the hypotheses for this problem. (4)

     (ii) Compute the test statistic. (6)

     (iii) At 95% confidence, test the hypotheses. That is, did the training program actually increase the production rates? (6)

14. (a) From a poll of 800 television viewers, the following data have been accumulated as to, their levels of education and their preference of television stations. We are interested in determining if the selection of a TV station is independent of the level of education.

Educational Level

| | High School | Bachelor | Graduate | Total |
|--------|-------------|----------|----------|-------|
| Public Broadcasting | 50 | 150 | 80 | 280 |
| Commercial Stations | 150 | 250 | 120 | 520 |
| Total | 200 | 400 | 200 | 800 |

     (i) State the null and the alternative hypotheses. (4)

     (ii) Show the contingency table of the expected frequencies. (4)

     (iii) Compute the test statistic. (4)

     (iv) The null hypothesis is to be tested at 95% confidence. Determine the critical value for this test. (4)

Or

(b)    The manager of a company believes that differences in sales performance depends upon the salesperson's age. Independent samples of salespeople were taken and their weekly sales record is reported below.

| Below 30 years No. of Sales | Between 30 & 45 years No. of Sales | Over 45 years No. of Sales |
|---|---|---|
| 24 | 23 | 30 |
| 16 | 17 | 20 |
| 21 | 22 | 23 |
| 15 | 25 | 25 |
| 19 | 18 | 34 |
| 26 | 29 | 36 |
|    | 27 | 28 |

(i)    State the null and alternative hypotheses.    (4)

(ii)   At 95% confidence, test the hypotheses using Kruskal Walis Test.    (12)

15.  (a)  Given below are five observations collected in a regression study on two variables, x (independent variable) and y (dependent variable).

| x | y |
|---|---|
| 2 | 4 |
| 3 | 4 |
| 4 | 3 |
| 5 | 2 |
| 6 | 1 |

(i)    Develop the least squares estimated regression equation.    (4)

(ii)   At 95% confidence, perform a $t$ test and determine whether or not the slope is significantly different from zero.    (4)

(iii)  Compute the coefficient of determination.    (4)

(iv)   Compute the coefficient of correlation.    (4)

Or

(b)    The quarterly sales (in thousands of copies) for a specific educational software over the past three years are given in the following table.

|  | 2003 | 2004 | 2005 |
|---|---|---|---|
| Quarter 1 | 170 | 180 | 190 |
| Quarter 2 | 111 | 96 | 120 |
| Quarter 3 | 270 | 280 | 290 |
| Quarter 4 | 250 | 220 | 223 |

(i)    Compute the four seasonal factors (Seasonal Indexes). Show all of your computations.    (6)

(ii)   The trend for these data is Trend = 174 + 4 t (t represents time, where t=1 for Quarter 1 of 2003 and t = 12 for Quarter 4 of 2005). Forecast sales for the first quarter of 2006 using the trend and seasonal indexes. Show all of your computations.    (10)

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