Reg. No. : ☐☐☐☐☐☐☐☐☐☐☐

# J 4040

## M.B.A. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2007.

### First Semester

### BA 100 — STATISTICS FOR MANAGEMENT

(Regulation 2002)

Time : Three hours                                    Maximum : 100 marks

Use of approved statistical tables permitted.

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1.  Define sampling distribution. *Unit 2*

2.  Brief about standard error. *unit 2*

3.  Distinguish between an estimator and an estimate. *unit-2*

4.  What is meant by null hypothesis? *unit-3*

5.  Write down the precautions in using chi-square test. *unit 4*

6.  Brief about F distribution. *unit 3*

7.  List the advantages of non-parametric methods. *Unit 4*

8.  Define correlation analysis. *unit 5*

9.  Differentiate between seasonal and irregular variations. *unit 5*

10. What are the stages in description of time series with all four variations? *unit 5*

PART B — (5 × 16 = 80 marks)

11. (a) (i) Annual coffee consumption is assumed to be normally distributed with an unknown mean $\mu$ and a standard deviation of about 0.57 Kg. If a sample of 36 households considered and their coffee consumption is recorded for one year. What is the probability that sample mean is within 0.23 Kg of population mean? How large a sample must be in order to be 98% certain that sample mean is within 0.23 Kg of population mean? *unit 2*                                    (8)

(ii) Stadium authorities are considering expanding seating capacity and want to determine average number of people who attend events and variability in this number. Following are attendance in 1000s at nine randomly selected sporting events. Find point estimates of the mean and variance of population from which sample was drawn. (8)

8.8, 14.0, 21.3, 7.9, 12.5, 20.6, 16.3, 14.1, 13.0

Or

(b) (i) Describe one tailed and two tailed tests of means using $t$ distribution. (8)

(ii) A storekeeper wants to purchase a used refrigerator and has randomly selected 125 ads and found that average price of a refrigerator in this sample to be Rs. 3,250. Standard deviation of used refrigerator prices is Rs. 615.

Establish an interval estimate for average price of a refrigerator so that shop keeper can be 68.3%, certain that population mean lies within this interval. What will be the above estimate for 95.5% surety? (8)

12. (a) (i) Explain the qualities of a good estimator. (8)

(ii) A company making presses hypothesizes that average life of its largest web press is 14,500 hours. Standard deviation of press life is 2,100 hours. From a sample of 25 presses, the company finds a sample mean of 13,000 hours. At a 0.01 significance level, should the company conclude that average life of presses is less than hypothesized 14,500 hours. (8)

Or

(b) (i) A ketchup manufacturer is to decide about production of a new extra-spicy brand. Market research of 6000 house holds showed 335 of above house holds would buy. A better survey made 2 years ago showed that 5% of house holds would purchase them. At 0.02 significance, should the company conclude that there is an increased interest in the extra spicy brand? (8)

(ii) Given a sample mean of 83, a sample standard deviation of 12.5 and a sample size of 22, test the hypothesis that the value of population mean is 70 against the alternative that it is more than 70 at 0.025 significance level. (8)

13. (a) (i) A brand manager is concerned that her brand's share may be unevenly distributed throughout the country in a survey of four geographic regions, with random sample of 100 consumers in each region, following results were obtained.

Region

| | NE | NW | SE | SW | Total |
|---|---|---|---|---|---|
| Purchasers | 40 | 55 | 45 | 50 | 190 |
| Non-purchasers | 60 | 45 | 55 | 50 | 210 |
| Total | 100 | 100 | 100 | 100 | 400 |

Develop a table of observed and expected frequencies. Also calculate sample $x^2$ value and state null and alternative hypothesis. Test at 0.05 significance level whether brand is equally preferred across the country. (12)

(ii) Explain the precautions in using F test. (4)

Or

(b) (i) At 0.10 level of significance can we conclude that the following 400 observations follow a Poisson distribution with $\lambda = 3$? (8)

| No. of arrivals/hour | 0 | 1 | 2 | 3 | 4 | 5 or more |
|---|---|---|---|---|---|---|
| No. of Hours | 20 | 57 | 98 | 85 | 78 | 62 |

(ii) A study compared the effects of four 1 month point of purchase promotions on sales. Unit sales for five stores using all four promotions in different months areas follows : (8)

| Free sample | 78 | 87 | 81 | 89 | 85 |
|---|---|---|---|---|---|
| One pack gift | 94 | 91 | 87 | 90 | 88 |
| Price Reductions | 73 | 78 | 69 | 83 | 76 |
| Refund by past | 79 | 83 | 78 | 69 | 81 |

Test whether promotions have different effects in sales at 0.01 level of significance by ANOVA.

J 4040

14. (a) (i) A large business enterprise selects graduates from two leading business schools and last year they tested the candidates to find which B' school is better. Test results out of maximum 100 points are as follows:

Test Scores

School A   93  97  69  73  84  76  92  90  88  84  87

School B   87  88  99  65  69  97  84  85  89  91  90  91  72

Use Mann-Whitney U test at 0.10 level of significance and find out which school is better. (8)

(ii) Discuss the estimation using regression line. (8)

Or

(b) (i) Following are ratings of aggressiveness ($X$) and amount of sales ($Y$) for 8 salesmen. Check whether there is a significant rank correlation between the two measures at 0.10 significant level? (8)

$X$   30  17  35  28  42  25  19  29

$Y$   35  31  43  46  50  32  33  42

(ii) In a company, data of overheads and units of production at different plants are as follows :

Overhead 191   170   272   155   280 173   234 116   153   178

Units      40    42    53    35    56  39    48  30    37    40

Develop regression equation and predict over head for 50 units of production. Also find standard error of estimate. (8)

15. (a) (i) A steel company has sold 18, 20, 21, 25 and 26 lakh tones of steel, respectively for the years 2002 to 2006. Determine linear estimating equation fitting the data, percent of trend, relative cyclical residual for the data. Also find the year in which fluctuation was maximum. (8)

(ii) Describe the six steps procedure in computing the seasonal index. Also state the uses of seasonal index. (8)

Or

(b) (i) Explain the four variations in time series with simple illustrations. (8)

(ii) A state agency monitoring irrigation pattern found following seasonal data of above irrigation in millions of cubic feet of river water.

|       | Winter | Spring | Summer | Fall |
|-------|--------|--------|--------|------|
| 2002  | 293    | 246    | 231    | 282  |
| 2003  | 301    | 252    | 227    | 291  |
| 2004  | 304    | 259    | 239    | 296  |
| 2005  | 306    | 265    | 240    | 300  |

Determine seasonal indices and deseasonalize these data using a 4 quarter centered moving average. (8)

———————

J 4040