M.B.A. DEGREE EXAMINATION, JANUARY 2007.

First Semester

BA 1601 — STATISTICS FOR MANAGEMENT

(Regulation 2005)

Time : Three hours   Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Give two uses for probability in business. *unit 1*

2. Distinguish between discrete and continuous probability distributions. *unit — 1*

3. What is the advantage of central limit theorem in sampling? *unit 2*

4. Give four factors affecting sample size. *unit — 2*

5. What is the null and alternative hypothesis? *unit - 3*

6. What is significance level? *unit 3*

7. Distinguish between parametric and non-parametric tests. *unit - 4*

8. When is Mann-Whitney U test used? *unit 4*

9. How is the accuracy of a regression equation measured? *unit · 5*

10. What are the components of a time series? *unit 5*

PART B — (5 × 16 = 80 marks)

11. (a) There are two boxes B_1 and B_2. B_1 contains two Red Balls and one green ball. B_2 contains one red ball and two green balls.

    (i) A ball is drawn from one of the boxes randomly. It is found to be red. What is the probability that it is from B_1?   (7)

unit 1

(ii) Two balls are drawn randomly from one of the boxes without replacement. One is red and the other is green. What is the probability that they came from B_1? (7)

(iii) A ball drawn from one of the boxes is white. What is the probability that it came from B_2? (2)

Or

(b) On an average six people per hour use an electronic teller machine during the prime shopping hours in a department store. What is the probability that

(i) Exactly six people will use the machine during a randomly selected hour. (4)

(ii) Fewer than five people will use the machine during a randomly selected hour. (4)

(iii) No one will use the facility in a 10 minute interval. (4)

(iv) No one will use the facility in a 5 minute interval. (4)

12. (a) For a particular consumer product, the sales per retail outlet last year in a sample of $n_1 = 10$ stores was $\bar{x}_1 = $ Rs. 3,425 with $s_1 = $ Rs. 200. For a second product, the mean dollar sales per outlet in a sample of $n_2 = 12$ stores was $\bar{x}_2 = $ Rs. 3,250 with $s_2 = $ Rs. 175. The sales per outlet are normally distributed. Estimate the difference between the mean level of sales per outlet last year using 95% confidence level. If the sample sizes $n_1 = 20$ and $n_2 = 24$, what would the difference in means be.

Or

(b) A metropolitan area sampled for 100 households yields only 6 households having at least one adult unemployed. In another area sampled for 100 households, 12 households have unemployed adults. Assuming 95% confidence levels, estimate the percentage of households with unemployed adults in the second area. Estimate the difference in percentage unemployment in households between the two surveyed areas. Use 90% confidence levels.

13. (a) The mean weekly wage for a sample of $n_1 = 30$ employees in a large firm is $\bar{x}_1 = $ Rs. 280, with a sample standard deviation of $s_1 = $ Rs. 14. In another firm, a sample of $n_2 = 40$ employees have a mean wage $\bar{x}_2 = $ Rs. 270 with a standard deviation $s_2 = $ Rs. 10. The standard deviations of the populations are not assumed to be equal. Test the hypothesis that there is no difference between the mean weekly wage amounts of the two firms at 5% significance level.

Or

(b) The following contingency table presents the reactions of legislators to a tax plan according to party affiliation. Test whether party affiliation influences the reaction to the tax plan.

Reaction

Party	In Favour	Neutral	Opposed	Total
Party A	120	20	20	160
Party B	50	30	60	140
Party C	50	10	40	100
Total	220	60	120	400

(Critical χ^2 for $df = 4$ is 13.28 at $\alpha = 1\%$).

14. (a) A consumer panel includes 14 individuals. It is asked to rate two brands of code cola according to a point evaluation system based on several criteria. The table given below reports the points assigned. Test the null hypothesis that there is no difference in the level of ratings for the two brands of cola at 5% level of significance, using the sign test. (Critical value of $t = 2.201$ for $\alpha = 5\%$, $df = 11$).

Point rating assigned

Panel Member	Brand 1	Brand 2
1	20	16
2	24	26
3	28	18
4	24	17
5	20	20
6	29	21
7	19	23
8	27	22
9	20	23
10	30	20
11	18	18
12	28	21
13	26	17
14	24	26

Or

(b) Two methods of instruction to apprentices is to be evaluated. A director assigns 15 randomly selected trainees to each of the two methods. Due to drop outs, 14 complete in batch 1 and 12 complete in batch 2. An achievement test was given to these successful candidates. Their scores are as follows :

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Method 1 : 70, 90, 82, 64, 86, 77, 84, 79, 82, 89, 73, 81, 83, 66

Method 2 : 86, 78, 90, 82, 65, 87, 80, 88, 95, 85, 76, 94.

Test whether the two methods have significant difference in effectiveness. Use Mann-Whitney test at 5% significance level. ($z = \pm 1.96$ for 5% significance level).

15. (a) An analyst takes a random sample of 10 truck shipments made by a company and records the distance in miles and delivery time to the nearest half day from the time that the shipment was available for pickup.

Shipment	1	2	3	4	5	6	7	8	9	10
Distance (x) :	825	215	1070	550	480	920	1350	325	670	1215
Delivery time (y) :	3.5	1.0	4.0	2.0	1.0	3.0	4.5	1.5	3.0	5.0

Find the regression equation of delivery time as a function of distance. If the distance is 1000 miles estimate delivery time. Can this regression estimate delivery time for a distance of 2500 miles.

Or

(b) The quarterly sales data for a graphics software company are given below. Determine the seasonal components.

Sales in Rs. '000

Quarter	1995	1996	1997	1998	1999	2000
1	500	450	350	550	550	750
2	350	350	200	350	400	500
3	250	200	150	250	350	400
4	400	300	400	550	600	650