

C 001

M.B.A. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2002.

First Semester

BA 100 -- STATISTICS FOR MANAGEMENT

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

Use of calculator and statistical tables is permitted.

PART A — (10 × 2 = 20 marks)

1. What is standard error? *- unit - 2*
2. Distinguish clearly between point estimate and interval estimate. *unit 2*
3. Explain the following with reference to testing of hypothesis : *unit 3*
Critical Region
4. Explain the various uses of χ^2 -test. *- unit - 4*
5. What is ANOVA? *- unit 3*
6. The following data represent the number of hours that a rechargeable hedge trimmer operates before a recharge is required :
1.5, 2.2, 0.9, 1.3, 2.0, 1.6, 1.8, 1.5, 2.0, 1.2 and 1.7.
unit - 4 Use the sign test to test the hypothesis of the 0.05 level of significance that this particular trimmer operates with a median of 1.8 hours before requiring a recharge.
7. What is regression? *unit 5*
8. State the utility of regression in the field of economic analysis. *unit 5*
9. What are the various methods of determining trend in a time series? *unit 5*
10. What do you mean by seasonal fluctuations in time series? *unit 5*

PART B — (5 × 16 = 80 marks)

11. Use the Kruskal-Wallis test to test for differences in mean among the three samples. If $\alpha = 0.01$, what are your conclusions?

Sample I	:	95	97	99	98	99	99	99	94	95	98
Sample II	:	104	102	102	105	99	102	111	103	100	103
Sample III	:	119	130	132	136	141	172	145	150	144	135

Unit 4

12. (a) (i) Out of 20,000 ledger accounts, a sample of 600 accounts was taken to test the accuracy of posting and balancing and 45 mistakes were found. Assign limits within which the number of mistakes can be expected to lie at 5% level. (6)

Unit 2

(ii) A machine produces metal rods used in an automobile suspension system. A random sample of 15 rods is selected and the diameter is measured. The resulting data are shown below. Assume that rod diameter is normally distributed. Construct a 95% two sided confidence interval on the mean rod diameter.

8.24, 8.23, 8.20, 8.21, 8.20, 8.28, 8.23, 8.26,
8.24, 8.25, 8.19, 8.25, 8.26, 8.23, 8.24 (10)

Unit 3

Or

(b) (i) Discuss the importance of student's t -distribution in tests of significance. When are the tests based on this distribution preferred to the other methods based on the normal distribution? (6)

(ii) The diameter of the dot produced by a printer is normally distributed with a mean diameter of 0.002 inch and a standard deviation of 0.0004 inch.

- (1) What is the probability that the diameter of a dot exceeds 0.0026 inch?
- (2) What is the probability that a diameter is between 0.0014 and 0.0026 inch?
- (3) What standard deviation of diameters is needed so that the probability in part (b) is 0.995? (10)

Unit 1

13. (a) (i) Ten individuals are chosen at random from a population and their heights are found to be (in inches) :

63, 63, 66, 67, 68, 69, 70, 70, 71 and 71

In the light of the data, discuss the suggestion that the mean height in the population is 66 inches. (6)

Unit 3

- (ii) Two machines are used for filling plastic bottles with a net volume of 16.0 ounces. The fill volume can be assumed normal, with standard deviation 0.020 and 0.025 ounces respectively. A member of the Quality engineering staff suspects that both machines fill to the same net volume, whether or not this volume is 16.0 ounces. A random sample of 10 bottles is taken from the output of each machine.

Machine I : 16.03 16.04 16.05 16.05 16.02 16.01 15.96 15.98 16.02 15.99

Machine II : 16.02 15.97 15.96 16.01 15.99 16.03 16.04 16.02 16.01 16.00

Machine III : 16.02 15.97 15.96 16.01 15.99 16.03 16.04 16.02 16.01 16.00

Do you think the engineer is correct? use $\alpha = 0.05$. (10)

Or

- (b) The contingency table below summarises the results obtained in a study conducted by a research organisation with respect to the performance of four competing brands of toothpaste among the users.

	Brand A	Brand B	Brand C	Brand D
No cavities	9	13	17	11
One to five cavities	63	70	85	82
More than 5 cavities	28	37	48	37

Test the hypothesis that incidence of cavities is independent of the brand of the toothpaste used.

14. (a) To study the performance of three detergents and three different water temperature, the whiteness readings were obtained with specially designed equipment.

Water Temp	Detergent		
	A	B	C
Cold water	57	55	67
Warm water	49	52	68
Hot water	54	46	58

Perform a two way analysis of variance using 5% level of significance.

Or

(b) (i) Weights in kilograms of 10 students are given below :

38, 40, 45, 53, 47, 43, 55, 48, 52, 49

Can we say that the variance of the distribution of weights of all students from which the above sample was drawn is equal to 20 square kgm? (6)

(ii) The melting points of two alloys used in formulating solder were investigated by melting 20 samples of each material. The sample mean and standard deviation for alloy 1 was $\bar{x}_1 = 421^\circ\text{F}$ and $s_1 = 4^\circ\text{F}$, while for alloy 2 they were $\bar{x}_2 = 426^\circ\text{F}$ and $s_2 = 3^\circ\text{F}$. Do the sample data support a claim that both alloys have the same variance of melting point? Use $\alpha = 0.05$ in reaching your conclusion. (10)

15. (a) Following is the distribution of students according to their height and weight :

Height in inches	Weight in lbs			
	90 - 100	100 - 110	110 - 120	120 - 130
50 - 55	4	7	5	2
55 - 60	6	10	7	4
60 - 65	6	12	10	7
65 - 70	3	8	6	3

Calculate

- (i) the co-efficients of regression and
(ii) obtain the two regression equations.

Or

(b) (i) From the data given below, fit a straight line trend by the method of least squares. (6)

Years	: 1975	1976	1977	1978	1979	1980	1981	1982
Sales (00,000 Rs.)	: 6.7	5.3	4.3	6.1	5.6	7.9	5.8	6.1

(ii) Calculate the seasonal indices by the ratio to the moving average method from the following data : (10)

Year	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
1	68	62	61	63
2	65	58	56	61
3	68	63	63	67
4	70	59	56	62
5	60	55	51	58

