

PART B — (5 × 16 = 80 marks)

11. (a) (i) Define normal distribution and discuss the chief characteristics of it. (6)

Unit 1

(ii) A company leases office copying machines and resells returned machines at a discount. Leases are normally distributed with a mean of 24 months and a standard deviation of 75 months.

Unit 1

(1) What is the probability that a copier will still be on lease after 28 months?

(2) What is the probability that a copier will be returned within one year? (10)

Or

Unit 2

(b) (i) What is the significance of sample size? (8)

Unit 2

(ii) Describe one tailed and two tailed tests of means using t-distribution. (8)

12. (a) (i) Explain and distinguish between point and interval estimates with an example. (8)

Unit 2

(ii) A school nurse is interested in knowing the average height of seniors at the school, but she does not have enough time to examine the records of all 430 seniors. She randomly selects 48 students. She finds the sample mean to be 64.5 inches and the standard deviation to be 2.3 inches.

(1) Find the estimated standard error of the mean

(2) Construct a 90 percent confidence interval for the mean. (8)

Or

Unit 3

(b) (i) Explain the basic concepts and test procedure for testing Hypothesis. (8)

Unit 3

(ii) A television documentary on overeating claimed that Americans are about 10 pounds over weight on average. To test this claim, 18 randomly selected individuals, were examined; their average excess weight was found to be 12.4 pounds, and the sample standard deviation was 2.7 pounds. At a significance level of 0.01, is there any reason to doubt the validity of the claim? (8)

13. (a) (i) How would you measure the power of the test in tests of hypotheses? Explain in detail. (8)

mit 3

(ii) It was estimated that about 72% of all households were cable TV subscribers. Newstime magazine's editors were sure that their readers subscribed to cable TV at a higher rate than the general population and wanted to use this fact to sell advertising space for premium cable channels. To verify this, they sampled 250 of Newstime's subscribers and found that 194 subscribed to cable TV. At a significance level of 2% does the survey data support the editor's belief? (8)

mit 3

Or

mit 4

(b) (i) Explain the chi-square test for independence of attributes. (6)

(ii) An advertising firm is trying to determine the demographics for a new product. They have randomly selected 75 people in each of 5 different age groups and introduced the product to them. The results of the survey are given below.

Age Group

Future Activity	18-29	30-39	40-49	50-59	60-69
Purchase frequently	12	18	17	22	32
Seldom purchase	18	25	29	24	30
Never purchase	45	32	29	29	13

mit 4

(1) Calculate the expected frequencies.

(2) State the null and alternative hypotheses.

(3) Calculate the sample Chi-square value.

(4) Examine whether the null hypothesis be rejected at 5% level of significance. (10)

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14. (a) A study compared the number of hours of relief provided by five different brands of antacid administered to 25 different people, each with stomach acid considered strong. The results are given below.

Brand				
A	B	C	D	E
4.4	5.8	4.8	2.9	4.6
4.6	5.2	5.9	2.7	4.3
4.5	4.9	4.9	2.9	3.8
3.8	4.7	4.6	3.9	5.2
4.1	4.6	4.3	4.3	4.4

omit 4

- (i) Compute the mean number of hours of relief for each brand and determine the brand mean. (4)
- (ii) Estimate the population variance using the between-column variance. (4)
- (iii) Estimate the population variance using the within-column variance computed from the variance within the samples. (4)
- (iv) Calculate the F-statistic. At 5% level of significance do the brands produce significantly different amounts of relief of people with strong stomach acid? (4)

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Or

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- (b) (i) Describe the non-parametric test with its advantages and disadvantages. (8)
- (ii) The News and clarion kept a record of the gender of the people who called the circulation office to complain about delivery problems with the sunday paper. For a recent sunday, these data were as follows

omit 4

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Test this sequence of randomness at 5% level of significance. Is there anything about the nature of this problem that would cause you to believe that such a sequence would not be random? (8)

15. (a) Sales of major appliances vary with the new housing market : when new home sales are good, so are the sales of dishwashers, washing machines, driers and refrigerators. A trade association compiled the following historical data (in thousands of units) on major appliance sales and housing starts :

Housing starts (thousands) :	2.0	2.5	3.2	3.6	3.3	4.0
Appliance sales (thousands) :	5.0	5.5	6.0	7.0	7.2	7.7
Housing starts (thousands) :	4.2	4.6	4.8	5.0		
Appliance sales (thousands) :	8.4	9.0	9.7	10.0		

- (i) Develop an equation for the relationship between appliance sales (in thousands) and housing starts (in thousands). (6)
- (ii) Interpret the slope of the regression line. (5)
- (iii) Compute and interpret the standard error of estimate. (5)

Or

- (b) (i) Discuss in detail the various components of variations in Time Series. (8)
- (ii) Rajan invested his life savings and began a part-time carpet-cleaning business in 1986. Since 1986, Rajan's reputation has spread and business has increased. The spread and business has increased. The average numbers of homes he has cleaned per month each year are :

Year :	1986	1987	1988	1989	1990	1991
Homes cleaned :	6.4	11.3	14.7	18.4	19.6	25.7
	1992	1993	1994	1995	1996	
	32.5	48.7	55.4	75.7	94.3	

- (1) Find the linear equation that describes the trend in these data. (4)
- (2) Estimate the no. of homes cleaned per month in 1997, 1998 and 1999. (4)

