MCM14 — ADVANCED BUSINESS STATISTICS

Time : Three hours   Maximum : 75 marks

SECTION A — (5 × 6 = 30 marks)

Answer ALL questions.

1. (a) On the basis of the following information compute

   (i) $r\ 23.1$.

   (ii) $r\ 13.2$

   (iii) $r\ 12.3$: $r\ 12 = 070$, $r\ 13 = 0.61$, $r\ 23 = 0.40$.

   Or

   (b) In a trivariate distribution : $\sigma_1 = 3, \sigma_2 = 4$, $\sigma_3 = 5$. $r\,23 = 0.4, r\,31 = 0.6, r\,13 = 0.7$.

   Determine the regression equation of $X1$ on $X2$ and $X3$, if the variates are measured from their means.

(b) The three samples below have been obtained from normal populations with equal variances. Test the hypothesis that the sample mean are equal :

8	7	12
10	5	9
7	10	13
14	9	12
11	9	14

The table value of F at 5% level of significance for $v_1 = 2$ and $v_2 = 12$ is 3.88 .

SECTION B — (3 × 15 = 45 marks)

Answer any THREE questions.

6. Discuss the differences between the correlation and regression. What are the different methods of correlation?

7. The following table gives the distribution of height of first year students of a college :

Height in inches	61	62	63	64	65	66	67
Frequency	2	10	11	38	57	93	106
Height in inches	68	69	70	71	72	73	74
Frequency	126	109	87	75	23	9	4

Test the normality of the distribution by comparing the proportion of cases bring between

8. For random sample of 10 persons , fed on diet A, the increased weight in pounds in a certain period were:

10, 6, 16, 17, 13, 12, 8, 14. 15, 9.

For another random sample of 12 persons, fed on diet B, the increase in the same period were :

7, 13, 22, 15, 12, 14, 18, 8 21, 23, 10, 17.

Test whether the diets A and B differ significantly as regards their effect on increase in weight. Given the following :

Degree of freedom	19	20	21	22	23
Value of t at 5% Level	2.09	2.09	2.08	2.07	2.07

9. From the adult male population of seven large cities random samples of married and un married men are given below were taken. Can it be said that there is a significant variation among the people of different cities in the tendency to marry?

City	A	B	C	D	E	F	G	Total
Married	170	285	165	106	153	125	146	1,150
Unmarried	40	125	35	37	55	35	33	360

(Given for $v = 6$, Chi square 0.05 = 12.6)

10. Kerala Traders co. Ltd., wishes to test whether its three salesmen A, B and C tend to make sales of the same size or whether they differ in their

selling ability as measured by the average size of their sales. During the last week there have been 14 sale calls- A made 5 calls, B made 4 calls and C made 5 calls. Following are the weekly sales record of the three salesmen:

A (Rs)	B (Rs)	C (Rs)
300	600	700
400	300	300
300	300	400
500	400	600
0	–	500

Perform the analysis of variance and draw your conclusions.

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4. (a) Define Chi-square test. What are the conditions and steps required to determine the value of Chi-square?

Or

(b) In an experiment on immunization of cattle from tuberculosis, the following results were obtained :

	Affected	Not affected
Inoculated	12	26
Not inoculated	16	6

Calculate chi-square test and discuss the effect of vaccine in controlling susceptibility to tuberculosis. (5% Value of chi-square for one degree of freedom = 3.84)

5. (a) The following data present the yields in quintals of common ten subdivisions of equal area of two agricultural plots :

Plot 1 6.2 5.7 6.5 6.0 6.3 5.8 5.7 6.0 6.0 5.8

Plot 2 5.6 5.9 5.6 5.7 5.8 5.7 6.0 5.5 5.7 5.5

Test whether the two sample taken from two random populations have the same variance. (5% point of F for $v_1 = 9$, $v_2 = 9$ is 3.18)

Or

2. (a) A bag contains 10 white and 6 black balls . 4 balls are successfully drawn out and not repeated. What is the probability that they are alternately of different colours?

Or

(b) A husband and wife appear in an interview for two vacancies in the same post. The probability of husband's selection is 1/7 and that of wife's selection is 1/5. What is the probability that:

(i) Both of them will be selected.

(ii) only one of them will be selected, and

(iii) None of them will be selected.

3. (a) What steps should be taken to select the sample? How to determine the sample size?

Or

(b) A random sample size 16 has 53 as mean. The sum of the squares of the deviations taken from mean is 135. Can this sample be regarded as taken from the population having 56 as mean? Obtain 95% and 99% confidence limits of the mean of the population. (for $v = 15$, $t_{0.05} = 2.13$ for $v = 15$, $t_{0.01} = 2.95$)