Seat No. : _____

DR-106

December-2025

Integrated MBA., Sem.-V

DSC-C-IMBA-354 : Quantitative Techniques

Time : 2:00 Hours] **[Max. Marks : 50**

Instructions : (1) The figures on the right-hand side indicate marks.
(2) Use of calculators and statistical tables is **Allowed**.

1. Explain the Principles of Sample Survey. **10**

OR

1. (a) A survey conducted by a shopping mall group showed that a family in a metro city spends an average of ₹ 500 on clothes every month. Suppose a sample of 81 families resulted in a sample mean of ₹ 540 per month and a sample standard deviation of ₹ 150. Develop a 95% confidence interval estimator of the mean amount spent per month by family. **5**

1. (b) The educational testing service conducted a study to investigate difference between the scores of female and male students on the Mathematics Aptitude Test. The study identified a random sample of 562 female and 852 male students who had achieved the same high score on the mathematics portion of test. That is, the female and male students viewed as having similar high ability in mathematics. The verbal scores for the two samples are given below :

	Female	**Male**
Sample Mean	547	525
Sample Standard Deviation	83	78

Do the data support the conclusion that given populations of female and male students with similar high ability in mathematics, the female students will have a significantly high verbal ability ? Test at 5% level of significance. **5**

2. State and Explain the principal steps in a Sample Survey. **10**

OR

2. (a) The average monthly electricity consumption for a sample of 100 families is 1250 units. Assuming the standard deviation of electric consumption of all families is 150 units. Construct a 95% confidence interval estimation of the actual mean electric consumption. **5**

2. (b) Suppose that a quality control manager at a bakery wants to estimate the proportion of loaves that are underweight. He believes that no more than 15% of the loaves are underweight. He wants his estimate to be within 0.03 of the true proportion with a 95% level of confidence. How large a sample should he take ? **5**

3. A manufacturing company has purchased three new machines of different makes and wishes to determine whether one of them is faster than the others in producing a certain output. Five-hourly production figures are observed at random from each machine and the results are given below. Use analysis of variance technique and determine whether the machines are significantly different in their mean speeds. Use $\alpha = 5\%$. **10**

	Machine A_1	**Machine A_2**	**Machine A_3**
Observations	25	31	24
	30	39	30
	36	38	28
	38	42	25
	31	35	28

OR

3. Two random samples drawn from two normal populations are :

Sample 1	**Sample 2**
20	27
16	33
26	42
27	35
23	32
22	34
18	38
24	28
25	41
19	43
	30
	37

Test using variance ratio test at 5 percent level of significance whether the two populations have the same variances. **10**

4. Explain Acceptance Sampling Inspection Plans. **10**

OR

4. In welding of seams, defects included pinholes, cracks, cold taps, etc. A record was made of the number of defects found in one seam each hour and is given below:
2, 4, 7, 3, 1, 4, 8, 9, 5, 3, 7, 11, 6, 4, 9, 9, 6, 4, 3, 9, 7, 4, 7, 12
Draw the control chart for number of defects and give your comments. **10**

5. Attempt any **five** out of **seven** : (**2** Marks each). **10**
   (1) The difference between population and sample study is _____.
   (2) Central Limit Theorem means _____.
   (3) The equation for obtaining pooled estimate is _____.
   (4) Which test is used for testing the equality of variances of two normal populations ? Also the state the formula.
   (5) State any 3 benefits of Statistical Quality Control.
   (6) The alternative formula for calculating the value of chi-square is _____.
   (7) The OC Curve is defined as _____.

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