



Seat No. : _____

DK-111

December-2025

Int. MBA, Sem.-V

DSC-M-354 : Quantitative Techniques

(New Course as per NEP)

Time : 2:00 Hours]

[Max. Marks : 50

- Instructions :** (1) Attempt new questions on new page.
(2) Non - Programmable scientific calculator can be used.
(3) Statistical Tables and Graphs will be provided on request.

1. Attempt the following : (Any **TWO**) **10**
- (a) An important proposal must be voted on, and a politician wants to find the proportion of people who are in favour of the proposal. Find the sample size needed to estimate the true proportion to within ± 0.05 at the 95 percent confidence level. Assume that you have a strong feeling that the proportion is 50 percent.
- (b) The manager of Cardinal Electric's lightbulb division must estimate the average number of hours that a lightbulb made by each lightbulb machine will last. A sample of 40 lightbulbs was selected from machine A and the average burning time was 1,416 hours. The standard deviation of burning time is known to be 30 hours.
- (i) Compute the standard error of the mean.
(ii) Construct 90% confidence interval for the population mean.
- (c) Explain probability sampling in detail.
2. Solve the following : (Any **TWO**) **10**
- (a) A company that is evaluating the promotability of its employees, that is, determining the proportion whose ability, training and supervisory experience qualify them for promotion to the next higher level of management. The human resources director tells the president that roughly 80% of the employees in the company are "promotable". The president assembles a special committee to assess the promotability of all employees. This committee conducts in - depth interviews with 150 employees and finds that in its judgement only 70% of the sample are qualified for promotion. Use 5% level of significance the human resources director's claim.

- (b) Two research laboratories have independently produced drugs that provide relief to arthritis sufferers. The first drug was tested on a group of 90 arthritis sufferers and produced an average of 8.5 hours of relief and a sample standard deviation of 1.8 hours. The second drug was tested on 80 arthritis sufferers, producing an average of 7.9 hours of relief and a sample standard deviation of 2.1 hours. At the 0.05 level of significance, does the second drug provide a significantly shorter period of relief ?
- (c) The data-processing department at a large life insurance company has installed new colour video display terminals to replace the monochrome units it previously used. The 25 operators trained to use the new machines averaged 7.2 hours before achieving a satisfactory level of performance. Their sample variance was 16.2 squared hours. Long experience with operators on the old monochrome terminals showed that they averaged 8.1 hours. At 0.01 significance level, should the supervisor of the department conclude that the new terminals take lesser time to operate ?

3. Solve the following : (Any **ONE**)

10

- (a) At the 0.10 level of significance, can we conclude that the following 400 observations follow a Poisson distribution with $\lambda = 3$?

Number of arrivals per hour	0	1	2	3	4	5 or more
Number of Hours	20	57	98	85	78	62

- (b) A fast-food chain feels it is gaining a bad reputation because it takes too long to serve the customers. Because the chain has four restaurants in this town, it is concerned with whether all four restaurants have the same average service time. One of the owners of the fast - food chain has decided to visit each of the stores and monitor the service time for 5 randomly selected customers. At his four noontime visits, he records the following service times in minutes :

Restaurant 1	3	4	5.5	3.5	4
Restaurant 2	3	3.5	4.5	4	5.5
Restaurant 3	2	3.5	5	6.5	6
Restaurant 4	3	4	5.5	2.5	3

Using a 0.05 significance level, do all the restaurants have the same mean service time ?

4. Solve the following : (Any **TWO**)

10

- (a) Explain 3 - σ limits in details.
(b) Draw p - chart from the following data and give your conclusion.

Inspected Items (n)	100	100	100	100	100	100	100	100	100	100	100	100	100	100	
Defective Items (d)	4	6	1	10	5	7	3	10	6	4	8	5	6	3	4

- (c) For a given single sampling plan (50, 10, 0), draw an O.C. curve.

5. Attempt the following :

10

(Attempt the question in given order and mentioned correct option for the answer with the question number, for example like:

(1) -a,

(2) -b,... and so on.)

(1) In large sample test, sample size should be at least

- (a) 30
(b) 90
(c) 60
(d) 120

(2) Dr. Shewhart has used _____ distribution in statistical quality control process.

- (a) Binomial
(b) Poisson
(c) Hyper geometric
(d) Normal

(3) X – bar and R chart is based on :

- (a) Binomial
(b) Poisson
(c) Hyper geometric
(d) Normal

(4) p - chart is based on ___ distribution.

- (a) Binomial
(b) Poisson
(c) Hyper geometric
(d) Normal

- (5) c - chart is based on ___ distribution
- (a) Binomial
 - (b) Poisson
 - (c) Hyper geometric
 - (d) Normal
- (6) Standard error is a standard deviation of
- (a) Sample
 - (b) Treatment
 - (c) Population
 - (d) Block
- (7) Probability of accepting a bad lot is
- (a) Producer's risk
 - (b) Both
 - (c) Consumer's risk
 - (d) None
- (8) Large sample test is based on
- (a) Z distribution
 - (b) F distribution
 - (c) t distribution
 - (d) Chi Square distribution
- (9) Small sample test is based on
- (a) Z distribution
 - (b) F distribution
 - (c) t distribution
 - (d) Chi Square distribution
- (10) Degree of freedom is
- (a) No. of independent items in sample
 - (b) Both
 - (c) No. of independent items in population
 - (d) None
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