Name : ....

Roll No. : ....

Invigilator's Signature : ....

CS/M.Tech(FT)/SEM-3/MFT-301/2012-13

2012
STATISTICAL METHODS

Time Allotted : 3 Hours   *Full Marks :* 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

GROUP – A
(Multiple Choice Type Questions)

1. Choose the correct alternatives for the following : 10 × 1 = 10

   i) Which one of the following is an absolute measure of dispersion ?

        a) Mean   b) Median

        c) Standard duration   d) Mode.

   ii) Which is the middle most value when the observations of a set are arranged in order of magnitude ?

        a) Mean   b) Mean deviation

        c) Range   d) Median.

40594   [Turn over

iii) The difference between the maximum and the minimum values of a set of observations is called

a) Standard deviation   b) Range

c) Mode   d) Variance.

iv) The unit of measurement for coefficient of variation is

a) gram   b) pound

c) unit free   d) both gram and pound.

v) The principle states that a few contributors to the cost are responsible for the bulk of cost. The principle is

a) Deming principle

b) Pareto principle

c) Ishikawa principle

d) Taguchi principle.

vi) The diagrammatic representation of bivariate data is known as

a) Fish-bone diagram

b) Cause and effect diagram

c) Pareto diagram

d) Scatter diagram.
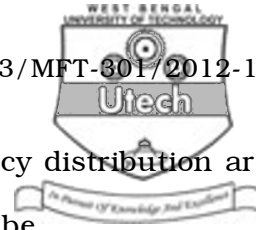
vii) If the mean and median of a frequency distribution are 20 and 17 respectively, the mode will be

a)   11   b)   18

c)   20   d)   15.

viii) The problem which requires an improvement process to solve the problem is called

a)   Sporadic problem   b)   Normal problem

c)   Chronic problem   d)   None of these.

ix)   The most common form of diagrammatic representation of a grouped frequency of distribution is

a)   Control chart   b)   Histogram

c)   Ishikawa diagram   d)   Scatter diagram.

x)   The median of set of 7 values (2, 5, 8, 4, 9, 6, 71) is

a)   8   b)   9

c)   6   d)   none of these.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following.   3 × 5 = 15

2. Write a short note an EVOP developed by GEP box for process improvement.

3. Write a brief account on chronic and sporadic problems with at least one example of each.

4. Huge packing defect has been a chronic problem for a biscuit manufacturing plant. After much discussion, the consensus called the "wisdom"-identified "frequent variety change" as the primary cause. A diagnostic approach based on facts was instituted. Here are the data on the cause of frequent variety changes :

Cause	Frequency
Sales demand	21
Labour agreement	16
Improper planning	65
Machine breakdown	25
Raw materials unavailability	19
Others	23

Convert the above data into a Pareto table having four columns : Cause, Frequency, Percentage of total frequency and Percentage cumulative frequency.

5. Write a short note Ishikawa diagram.

6. a) Karl Pearson's coefficient of correlation between x and y is 0·52, their covariance is 7·8. If the variance of x is 16, find the standard deviation of y.

   b) Two uncorrelated random variables x and y have standard deviations 3 and 4 respectively. Find the SD of $(x + y)$.

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. $3 \times 15 = 45$

7. What is a factorial experiment ? Define the terms 'main effects' and 'interaction effects' in relation to a 2^3 experiment. Classify different types of designs in terms of type of application.

8. Define 'Process capability'. How will you measure the ability of a process in terms of Process capability ? Write down a summary of the deliverables and tools typically used in each phase of six sigma improvement.

9. Write a short note on 'Cross-over design'. A food processing unit was interested to develop a product with optimum sweetness. Four recipes were developed and sugar content for each recipe were determined number of times and the results were tabulated. From the following data, can we conclude whether recipe variation has in effect on sugar content ?

Recipe and Sugar Content

Recipe 1	Recipe 2	Recipe 3	Recipe 4
62	63	68	56
60	67	66	62
63	71	71	60
59	64	67	61
	65	68	63
	66	68	64
			63
			59

10. Draw a cause-effect diagram for "Preparation of delicious cooked rice". Give a brief outline of factor analysis and discuss its importance for designing food safety.

11. Define the term 'Regression'. What is meant by regression of x and y ? Fit a least square line to the data below using :

(i) x as the independent variable

(ii) y as the independent variable.

Find y when $x = 5$ and $x = 12$.

Also find x when $y = 7$.

x	3	5	6	8	9	11
y	2	3	4	6	5	8