

**Note: Examination scheme and mode shall be as prescribed by the Examination Branch University of Delhi, from time to time.**

## DISCIPLINE SPECIFIC CORE COURSE-11: TOTAL QUALITY MANAGEMENT

### CREDIT DISTRIBUTION, ELIGIBILITY, AND PRE-REQUISITES OF THE COURSE

Course title & Code	Credits	Credit distribution of the Course			Eligibility Criteria	Pre-requisite of the Course (if any)
		Lecture	Tutorial	Practical/ Practice		
Total Quality Management	4	3	0	1	Class XII with Mathematics	Introductory statistics and familiarity probability distributions

#### Learning Objectives:

The learning objectives of this course are as follows:

- To introduce statistical and management techniques,
- To explain the approach of Quality control being used in industry to manufacture goods and services of high quality at low cost.
- To introduce Six-sigma, TQM which is in high demand in the market both in the manufacturing as well as the service sector

#### Learning Outcomes:

After completing this course, students should be able to:

- Understand the concept of quality, its historical background, and ISO standards.
- Apply the statistical process control tools and product control tools.
- Understand the idea of Six sigma- Lean manufacturing, TQM
- Comprehend the Six sigma training plans, Voice of customers (VOC), Critical to Quality (CTQ)
- Analyze the data to find the root cause of defects through DMAIC (Define-Measure-Analyze-Improve-Control).

### SYLLABUS OF DSC-11

#### Theory

#### UNIT I

(9 Hours)

#### Basics of Quality Management

Quality: Definition, dimensions of quality, its concept, application, and importance. Brief historical perspective of quality control and improvements, Quality Gurus, and Quality Hall of

Fame. Quality system and standards: Introduction to ISO quality standards, Quality registration. Introduction to Process and Product Control, Statistical Process Control - Seven tools of SPC, Chance and Assignable causes of quality variation.

## **UNIT II**

**(12 Hours)**

### **Statistical Control Charts**

Statistical Control Charts- Construction and Statistical basis of 3- $\sigma$  Control charts,. Control charts for variables: X-bar & R-chart, X-bar & s-chart. Rational Sub-grouping, Revised and Modified Control Limits. Control charts for attributes: np-chart, p-chart, c-chart and u-chart. Comparison between control charts for variables and control charts for attributes. Analysis of patterns on a control chart, estimation of process capability.

## **UNIT III**

**(12 Hours)**

### **Sampling Plans**

Acceptance sampling plan: Principle of acceptance sampling plans. Single and Double sampling plans, their Operating Characteristic (OC), Acceptance Quality Level (AQL), Lot Tolerance Percent Defective (LTPD), Average Outgoing Quality (AOQ), Average Outgoing Quality Limit (AOQL), Average Sample Number (ASN), and Average Total Inspection (ATI) functions with graphical interpretation, use, and interpretation of Dodge and Romig's sampling inspection plan tables.

## **UNIT IV**

**(12 Hours)**

### **Six-Sigma**

Overview of Six Sigma, Lean Manufacturing, and Total Quality Management (TQM). Organizational Structure and Six Sigma training plans- Selection Criteria for Six Sigma roles and training plans. Voice of customers (VOC): Importance and VOC data collection. Critical to Quality (CTQ), Introduction to DMAIC (Define-Measure-Analyze-Improve-Control).

## **PRACTICAL / LAB WORK – 30 Hours**

### **List of Practical:**

1. Construction and interpretation of statistical control charts for
  - a)  $\bar{X}$  and R-chart for known parameters.
  - b)  $\bar{X}$  and R-chart with revised control limits for unknown parameters.
  - c)  $\bar{X}$  and s-chart
  - d) np-chart
  - e) p-chart with fixed sample size
  - f) p-chart with variable sample size.
  - g) c-chart
  - h) u-chart
2. Construction and interpretation of OC, AQL, LTPD, ASN, ATI, AOQ, and AOQL curves under a Single sample inspection plan
3. Construction and interpretation of OC, AQL, LTPD, ASN, ATI, AOQ, and AOQL curves under a Single sample inspection plan for varying acceptance numbers.
4. Calculation of process capability and comparison of 3-sigma control limits with specification limits.

5. Plan a single sampling plan using Dodge and Romig sampling inspection tables.

**Practical work to be conducted using electronic spreadsheet / EXCEL/ Statistical Software Package/ SPSS/ calculators.**

**ESSENTIAL READINGS:**

- Goon A M, Gupta M K and Dasgupta B (2018): Fundamentals of Statistics, Volume I & II, 9<sup>th</sup> Edition and 4<sup>th</sup> reprint.
- Montgomery, D. C. (2009): Introduction to Statistical Quality Control, 6th Edition, Wiley India Pvt. Ltd.
- Ehrlich, B. Harris (2002): Transactional Six Sigma and Lean Servicing, 2nd Edition, St. Lucie Press.

**SUGGESTED READING:**

- Gupta S.C., Kapoor V.K.(2007): Fundamentals of Applied Statistics. 4th Edition, Sultan Chand and Sons., New Delhi.
- Hoyle, David (1995): ISO Quality Systems Handbook, 2nd Edition, Butterworth Heinemann Publication.

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**DISCIPLINE SPECIFIC CORE COURSE-12: TIME SERIES ANALYSIS**

**CREDIT DISTRIBUTION, ELIGIBILITY, AND PRE-REQUISITES OF THE COURSE**

Course title & Code	Credits	Credit distribution of the Course			Eligibility Criteria	Pre-requisite of the Course (if any)
		Lecture	Tutorial	Practical / Practice		
Time Series Analysis	4	3	0	1	Class XII with Mathematics	Introductory probability theory and statistics, Calculus and matrix algebra

**Learning Objectives:**

The learning objectives of this course are as follows:

- To introduce basic time series analysis, trend, and seasonality,
- To understand spectral analysis,
- To familiarise students with stationary processes,
- To understand various time series models,