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Govt. of Maharashtra  
**GOVT. COLLEGE OF ENGINEERING, KARAD**  
(An Autonomous Institute of Govt. of Maharashtra)  
Vidyanagar, Karad -415124 Dist.- Satara

NO. GCEK/ MED/ Quotation invitation/ CMM Training/ 809

Date: 16/02/2024

### Quotation Invitation

**Sub:** Quotation calling for Training of Geometric Dimensioning & Tolerancing for Two Days and One Day on 3-D Co- ordinate

**Ref:** Gcek/Med/Skill Enhancement Training/1104/Dated On 05-02-2024

With reference to subject mentioned above, you are requested to quote your rates for conduction of training program "Geometric Dimensioning & Tolerancing" On CMM. The details are as below. Your quotation should reach this office on or before 28/02/2024.

The price should be quoted F.O.R Institute, GCE Karad. The price should be quoted with all taxes stated separately.

On the top of it should be mentioned "QUOTATION FOR GOVERNMENT COLLEGE OF ENGINEERING KARAD Due on 28/02/2024" Training content Attached in Annexure I.

| Sr. No | Content of training   | No. Of Participant                           |
|--------|---|--|
| 01     | Per Participant Training Charge for Geometric Dimensioning & Tolerancing for Two Days and one Day on 3-D Co- ordinate<br>Measuring Machine. (Total 3 Days)<br><b>Machine Model :</b> CNC CMM Accurate Spectra<br><b>Software:</b> Tangram<br><b>Training content:</b> Attach annexure I | 81 Student + 06 faculty and supporting staff |

#### Terms and conditions:

Payment terms: 100% payment after successful training conduction

#### General terms:

- 1) The undersigned reserve the right to accept or reject any offer without assigning any reason thereof
- 2) Institute: GST 27AACTG7970M1Z1

Principal

Government College of Engineering Karad.

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## Annexure I

### CMM and GD&T

#### 3 Days Practical Course

##### UNIT-1 (GD & T STANDARD)

##### CHAPTER-1 - INTRODUCTION

- What is Geometric dimensioning and Tolerancing
- Scope of GD&T standard ASME Y14.5 2018
- Purpose & objective
- When to use GD& T
- Tolerance Expressions
- Definitions
- Fundamental rules

##### CHAPTER-2 - SYMBOLOGY

- Use of notes on the engineering drawing
- Geometric characteristics symbols
- Modifying symbols
- Counter bore and spot face symbols
- Counter sink & depth symbol

##### CHAPTER-3 – DATUM

- Six degrees of freedom
- Developing datum reference frame
- Importance of datum precedence
- Tolerance zone
- Tolerance zone shapes
- Datum identifications
- Common datum
- Datum target

##### CHAPTER-4 – FORM TOLERANCES

- Introduction
- Straightness
- Flatness
- Circularity / Roundness
- Cylindricity

##### CHAPTER-5 – ORIENTATION TOLERANCES

- Introduction
- Angularity
- Parallelism
- Perpendicularity

##### CHAPTER-6 – LOCATION TOLERANCES

- Introduction

- Position
- Concentricity
- Symmetricity

#### **CHAPTER-7 – MODIFIERS**

- Introduction
- Maximum Material Condition (MMC)
- Least Material Condition (LMC)
- Bonus Tolerance
- Projected Tolerance Zone (P)

#### **CHAPTER- 8 – RUNOUT TOLERANCES**

- Introduction
- Run out tolerance datum features
- Run out tolerance control features
- Run out tolerance zone
- Radial run out
- Total run out
- Run out tolerance for planar surface

#### **CHAPTER-9 – PROFILE TOLERANCES**

- Introduction.
- Types of Profile Tolerance.
- Profile Specifications
- Unilateral and Unequally Disposed Profile Tolerance
- Tolerance zone boundaries
- Uniform and Non-Uniform Tolerance Zones
- Profile Tolerance for Planer Surfaces.

#### **UNIT-2 (CMM – 3D COORDINATE MEASURING MACHINE)**

##### **CHAPTER-1 – INTRODUCTION**

- What is CMM
- Configuration of CMM
- Mechanical structure of machine
- Probing system
- Electronic control system
- Application software

##### **CHAPTER-2 - TYPES OF CMM**

- Bridge type CMM
- Gantry type CMM
- Horizontal Arm type CMM
- Articulated Arm Portable type CMM
- CHAPTER- 3 – PROBING SYSTEM –A

- Probing System
- Selection criteria of probing system
- Manual indexing Head Vs Automated Indexing Head
- MH20i
- MH8
- MIH
- PH10 PLUS

##### **CHAPTER- 3 – PROBING SYSTEM –B**

- Probes

- Selection criteria of probe type
- Touch trigger probes- Kinematic resistive probe
- Kinematic resistive probe operation
- Factors in measurement performance
- TP20 probe and modules
- Touch trigger probes – Staring gauge probe
- Strain gauge probe operation
- Strain gauge probe characteristics
- TP200 and modules
- Touch trigger probes performance comparison
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#### **CHAPTER- 3 – PROBING SYSTEM –C**

- Scanning Probe Technology
- How scanning Probe Work
- SP25M
- SP80

#### **CHAPTER- 3 – PROBING SYSTEM –D**

- 5-Axis Probe Technology
- PH20 Head Touch 5-Axis Probing
- Revo Head Continuous Scanning 5-Axis Probing

#### **CHAPTER- 4 – PREPERATION FOR MEASUREMENTS**

- Importance of cleanliness of Machine & part
- Effect of Temperature and Humidity on CMM Structure
- Effect of Temperature and Humidity on Measuring Part
- Clamping of the parts on machine

#### **CHAPTER- 5 – STARTING OF CMM MACHINE**

- Switching ON Air Compressor
- Switching ON Refrigerated Air Drier
- Switching ON main power Supply
- Switching ON Computer System
- Switching ON Electronic System
- Homing of CMM

#### **CHAPTER- 6 – STYLUS SELECTION AND CALIBRATION**

- Guideline for selection of stylus
- purpose of probe calibration
- Effect of calibration on measuring results

#### **CHAPTER- 7 – GEOMETRY MEASUREMENTS**

- Part features
- Types of Geometry
- Characteristics of Geometries

#### **CHAPTER- 8 – FEATURE CONSTRUCTIONS**

- Necessity of feature construction
- Matrix of feature construction

#### **CHAPTER- 9 – GEOMETRIC RELATIONS AND TOLERANCES**

- Measurement of sizes
- Linear dimensioning and Angular dimensioning
- Geometric dimensioning and tolerances

#### **CHAPTER- 10 – MEASUREMENT WITH CAD**

- What is CAD and types of formats
- Uses of CAD in CMM software