



# Sample Test Project

**District / Zonal Skill Competitions**

**Skill- Mechanical Engineering CAD**

*Category: Manufacturing & Engineering Technology*

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## Section - A

### *A. Preface*

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#### **Skill Explained:**

Computer aided design is the use of computer systems to assist in the creation, modification, analysis, or optimization of an engineering design. CAD software is used to increase the productivity of the designer, improve the quality of design, improve communication through documentation, and create a database for manufacturing. CAD output is often in the form of electronic files for print, manufacturing or other manufacturing processes. The technical and engineering drawings and images must convey information such as materials, processes, dimensions and tolerances according to application-specific conventions.

#### **Eligibility Criteria (for IndiaSkills 2018 and WorldSkills 2019):**

Competitors born on or after 01 Jan 1997 are only eligible to attend the Competition.

**Total Duration:** 4 Hrs

## Section - B

### B. Test Project

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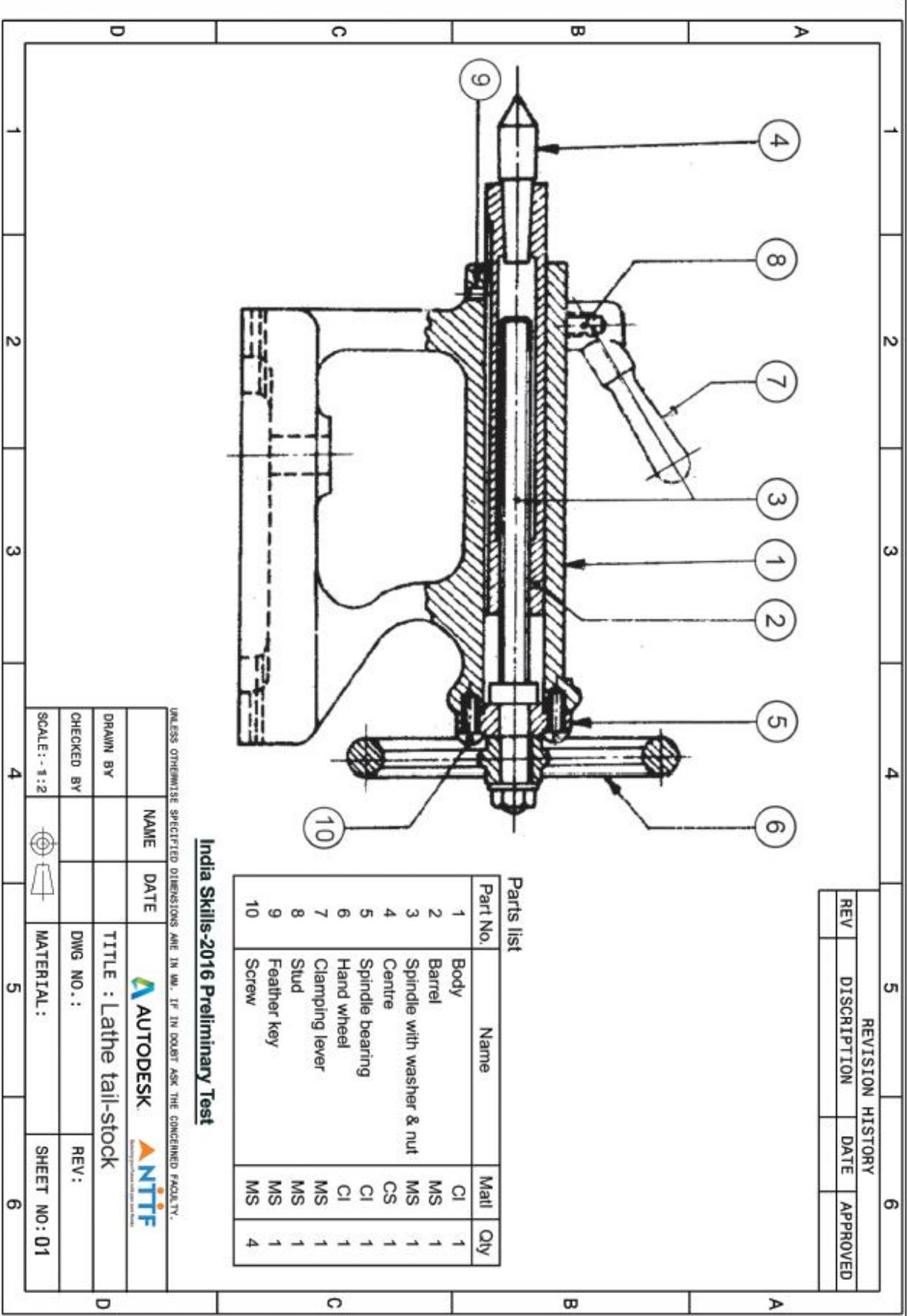
#### Prerequisites for the State/District Competition:

- Familiarity with the software. (Autodesk Inventor - v.2016 and above)
  - To interpret 2D drawings & create 3D models from detail drawings;
  - To create an assembly of parts in 3D & to produce detail drawing(s)
  - Selection of standards from content library
- Familiarity with Basic measuring instruments like Vernier caliper, Micrometer & radius gauges and Angle measuring instruments

Knowledge in Geometrical dimension and tolerances.

#### Details of the competition:

- The competitor must be able to read the drawing, model the 3D model, create the 2D drawings from the CAD Model created and dimension it as per the specifications mentioned in the drawing with necessary tolerances and manufacturing symbols. The completed test projects will be evaluated by a jury panel. The test duration is for 4 Hrs. The competition will be on Autodesk Inventor version v.2016 and above.
- The test is for 50 marks
- The below drawing is an example of **First test – Mechanical Assemblies and detail drawings for manufacture.**



REVISION HISTORY		
REV	DISCRIPTION	DATE
		APPROVED

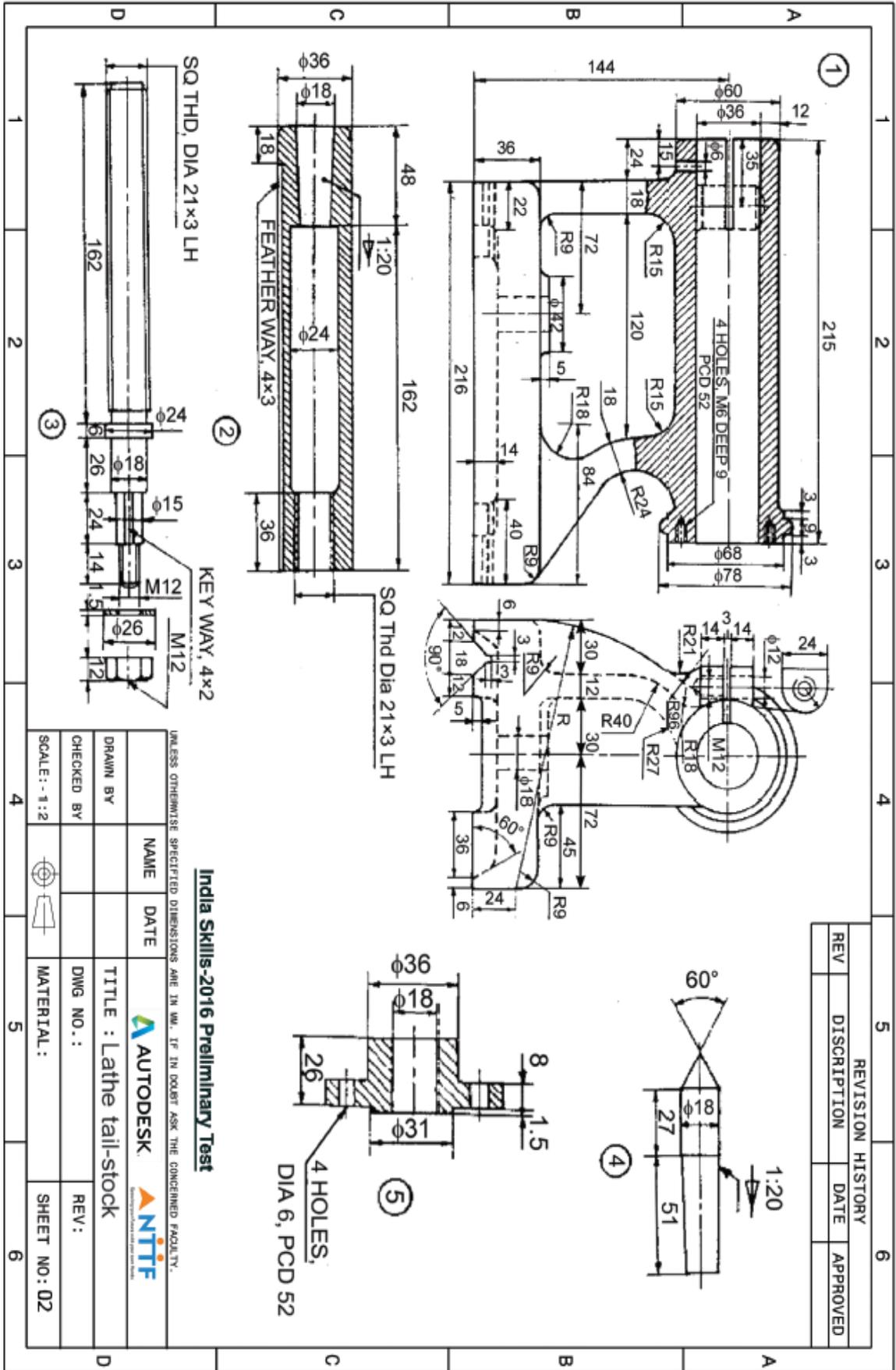
**Parts list**

Part No.	Name	Matl	Qty
1	Body	CI	1
2	Barrel	MS	1
3	Spindle with washer & nut	MS	1
4	Centre	CS	1
5	Spindle bearing	CI	1
6	Hand wheel	CI	1
7	Clamping lever	MS	1
8	Stud	MS	1
9	Feather key	MS	1
10	Screw	MS	4

**India Skills-2016 Preliminary Test**

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MM. IF IN DOUBT ASK THE CONCERNED FACULTY.

NAME	DATE	AUTODESK	NTTF
TITLE : Lathe tail-stock			
DRAWN BY		DWG NO. :	REV :
CHECKED BY		MATERIAL :	SHEET NO: 01
SCALE: - 1:2			



India Skills-2016 Preliminary Test

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MM. IF IN DOUBT ASK THE CONCERNED FACULTY.

**AUTODESK**

**NITF**

TITLE : Lathe tail-stock

DWG NO. :

REV :

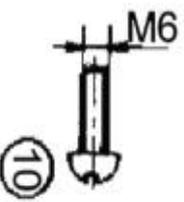
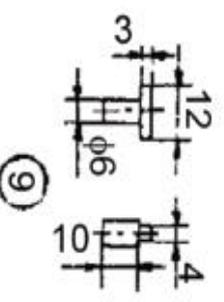
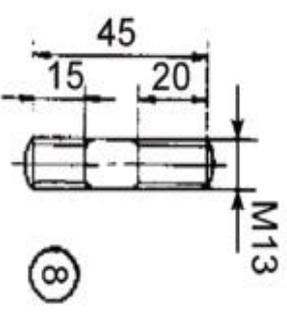
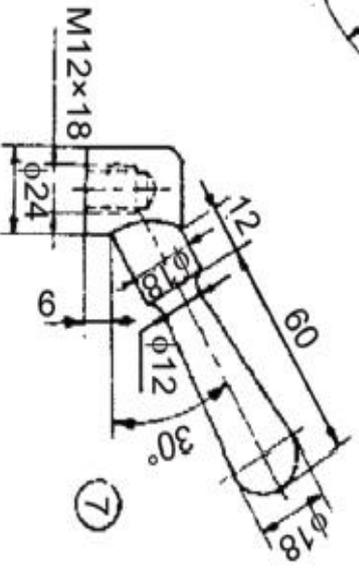
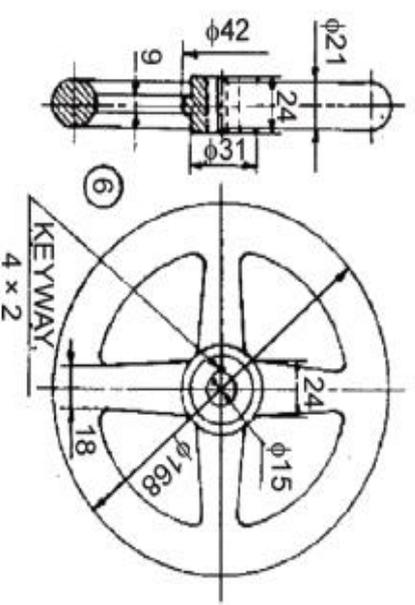
MATERIAL :

SHEET NO : 02

SCALE : - 1:2



REVISION HISTORY		
REV	DISCRPTION	DATE



**India Skills-2016 Preliminary Test**

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MM. IF IN DOUBT ASK THE CONCERNED FACULTY.

NAME	DATE	AUTODESK	NITF
DRAWN BY		TITLE : Lathe tail-stock	
CHECKED BY		DWG NO. :	REV :
SCALE: - 1:2		MATERIAL :	SHEET NO: 02

Grid lines: A, B, C, D (vertical); 1, 2, 3, 4, 5, 6 (horizontal)

# Section – C

## C. Marking Scheme

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### Marking Scheme:

The Assessment is done by awarding points by adopting two methods - Measurement and Judgments

- **Measurement –**  
It is used to assess the aspect which is measurable. It is used to assess the accuracy & precision of the dimensions of the Test Project
- **Judgment –**  
It is used to assess other performance which can be measured in a robust way. It is used where there should be no ambiguity.

Judgments are made based on Industry expectations. It is used to assess the quality of performance, for which there may be small differences of view when applying the external benchmarks.

Aspects are criteria's which are judged for assessment

### First test: Mechanical Assemblies and detail drawings for manufacture

Create part models for all parts mentioned in the drawing - **20 Marks** (All measurable)

Create detailed 2D drawing and Assembly drawings– **20 marks**

- (Judgemental: 4-5%, Measurable 90-96%) Approx.

Dimensioning and Part list (BOM) – **10 marks**

- (Judgemental: 4-5%, Measurable 90-96%) Approx.

Criteria	Judgment	Measurement	Total
Part modeling		20	20
Assembly modeling		30	30
Dimensioning (Inc. GDT)		30	30
Drawing views and presentation	4	16	20
Grand Total	4	96	100

Further breakup into detailed marking scheme:

### Judgment Marking Form

Skill Number:   05  

Skill Name: Mechanical Engineering Design-

CAD

Competitor No: \_\_\_\_\_

Competitor Name:

Sub criterion: Drawing views and presentation

Aspect ID	Max Mark	Aspect Criterion – Description
1	2.0	Rendered image
2	2.0	Animation

Experts Score (0 – 3)		
1	2	3

Mark Awarded



4.00 Maximum Mark for Sub criterion

Mark Awarded 0.00

Signatures of experts selected to confirm the accuracy of this printed result

Σ Scores x (Max Mark)

Compatriot Expert 1

Chief Expert

Mark Awarded = .....

Date and Time	
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### Measurement Marking Form

Skill Number: 05

Skill Name: Mechanical Engineering

Design-CAD

Competitor No: \_\_\_\_\_

Competitor Name: \_\_\_\_\_

Sub criterion: Part modeling

Aspect ID	Max Mark	Aspect Criterion – Description	Requirement or Nominal Size	Result or Actual Value	Mark Awarded
A	2	Body	Presence of the part		
B	2	Barrel	Presence of the part		
C	2	Spindle with washer & nut	Presence of the part		
D	2	Centre	Presence of the part		
E	2	Spindle bearing	Presence of the part		
F	2	Hand Wheel	Presence of the part		
G	2	Clamping lever	Presence of the part		
H	2	Feather Key	Presence of the part		
I	2	Screw	Presence of the part		
J	2	Full Assembly	Presence of the part		

=====  
20.00 Maximum Mark for Sub criterion

Mark Awarded 0.00  
=====

Signatures confirming the accuracy of this entry result

Expert 1

Chief Expert

Date and Time	

## Measurement Marking Form

Skill Number: 05

Skill Name: Mechanical Engineering Design-CAD

Competitor No: \_\_\_\_\_

Competitor Name: \_\_\_\_\_

Sub criterion: Assembly modeling

Aspect ID	Max Mark	Aspect Criterion – Description	Requirement or Nominal Size	Result or Actual Value	Mark Awarded
a	3	Spindle Sub-Assembly			
b	3	Main assembly			
c	3	Assembly without sub-assembly			
d	3	Exploded view of main assembly			
e	3	Exploded view Spindle Assembly			
f	3	Item list			
g	3	Part number details			
h	3	Title block			
i	3	Dimensioning			
j	3	Volume			

30.00 Maximum Mark for Sub criterion

Mark Awarded

Signatures confirming the accuracy of this entry result

Expert 1

Chief Expert

Date and Time	
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### Measurement Marking Form

Skill Number: 05

Skill Name: Mechanical Engineering Design-CAD

Competitor No: \_\_\_\_\_

Competitor Name: \_\_\_\_\_

Sub criterion: Dimensioning (Incl GD&T)

Aspect ID	Max Mark	Aspect Criterion – Description	Requirement or Nominal Size	Result or Actual Value	Mark Awarded
a	3	Body	Dimensions		
b	3	Barrel	Dimension		
c	3	Spindle with washer & nut	Dimension		
d	3	Centre	Dimension		
e	3	Spindle bearing	Dimension		
f	3	Hand Wheel	Dimension		
g	3	Clamping lever	Dimension		
h	3	Feather Key	Dimension		
i	3	Screw	Dimension		
j	3	Full Assembly	Dimension		

30.00 Maximum Mark for Sub criterion

Mark Awarded

Signatures confirming the accuracy of this entry result

Expert 1
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Chief Expert
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Date and Time	
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## Measurement Marking Form

Skill Number: 05

Skill Name: Mechanical Engineering Design-

CAD

Competitor No: \_\_\_\_\_

Competitor Name:

Sub criterion: Drawing views & Presentation

Aspect ID	Max Mark	Aspect Criterion – Description	Requirement or Nominal Size	Result or Actual Value	Mark Awarded
a	4	All drawings			
b	3	All 2D detail drawings			
c	3	Rendered image in Defined format			
d	3	Animation Duration.			
e	3	All 3d assembly drawings			

16.00 Maximum Mark for Sub criterion

Mark Awarded         

Signatures confirming the accuracy of this entry result

Expert 1

Chief Expert

Date and Time	
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## MARKING SUMMARY FORM

Skill No: 05  
Design-CAD

Skill Name: Mechanical Engineering

Competitor No: \_\_\_\_\_

Competitor Name: \_\_\_\_\_

Criterion ID	Criterion Description	Max	Actual
B1	Part modeling	20	
B2	Assembly modeling	30	
B3	Dimensioning (Inc. GDT)	30	
B4	Drawing views and presentation	20	
Grand total		100	

Result confirmed by	Signed with date
Compatriot/Independent expert	
Chief expert	
Jury president	

## Section - D

### D. Infrastructure List

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- Institute/ Engineering colleges with Computer labs having Workstations with a minimum configuration of
  - 8 GB RAM
  - Disk Space: 40 GB
  - Microsoft Direct3D 10® capable graphics card or higher
- Authorized Autodesk Training centers.

	<b>MEASURING INSTRUMENTS</b>		
29	Digital Vernier caliper 0-150 mm		
30	Dial Vernier caliper 0-150 mm		
31	Outside micrometers 0-25		
32	Depth micrometers 0-25		
33	Plain protractor		
34	Dial indicators with magnetic stand		
35	Universal dial (0.01mm)		
36	Straight edge 150 mm		
37	Scriber		

## Section – E

### **E. Instructions for candidates**

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- Read the competitor instructions carefully. (Print given to you along with the drawings)
- Study the drawing and interpret all the details given to you.
- Take a proper attention towards all the deliverables asked for.
- Your exam will be stopped exactly after the time allotted.
- Don't attempt to talk to any other competitor.
- Always ask the exam coordinator for any clarification needed.
- Handover all the deliverables to the exam coordinator at the end of the test.

## Section – F

### **F. Health, Safety, and Environment**

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1. All accredited participants, and supporting volunteers will abide by rules and regulations with regards to Health, Safety, and Environment of the Competition venue.
2. All participants, technicians and supporting staff will wear the required protective Personnel clothing.
3. All participants will assume liability for all risks of injury and damage to property, loss of property, which might be associated with or result from participation in the event. The organizers will not be liable for any damage, however in case of Injury the competitor will immediately inform the immediate organizer for medical attention.