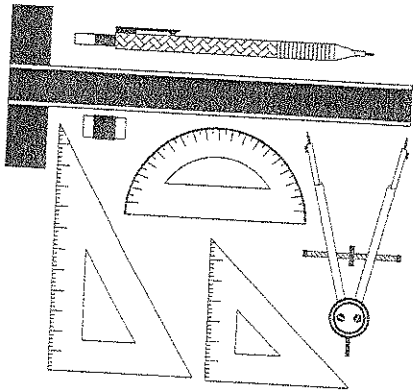
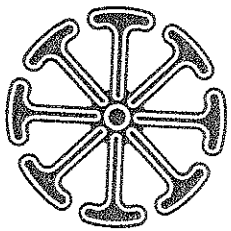
HILLCREST HIGH SCHOOL

TRIALS EXAMINATION
ENGINEERING, GRAPHICS & DESIGN

GRADE 12
2014
PAPER 2



MARKS: 200 **TIME**: 3 HOURS



INSTRUCTIONS TO CANDIDATES

1. This question paper consists of **7 pages** including the cover page and **4 questions**.
2. **All** questions must be answered.
3. Unless specified otherwise, all questions are in **Third Angle Orthographic Projection**.
4. Unless specified otherwise, all questions are to be completed to a **scale of 1:1**.
5. **All** answer sheets must be re-stapled in numerical order, even questions that are not attempted/blank.
6. All **construction work** must be shown, even if a stencil was used.
7. Print your **NAME** neatly on each page.
8. Use only the **drawing sheets** provided.
9. Your drawings should reflect **neatness** and **accuracy**.
10. All dimensions or detail not given may be **assumed** in **good proportion**.

QUESTION	SECTION	MARK	MAXIMUM
1	MECHANICAL ANALYTICAL		25
2a	LOCI: CAM PROFILE		20
2b	LOCI: MECHANISM		20
3	ISOMETRIC PROJECTION		40
4	MECHANICAL ASSEMBLY		95
TOTAL			200
SYMBOL			100

NAME

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APPROVED BY:	Sonali Moodley
DRAWING NO:	2012 - SSE
REFERENCE NO:	SSE/12

MACHINING: GRIND 0,02 / 0,2 — WELDING

MACHINING COMPANY: D.O.E PTY

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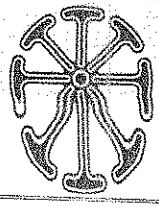
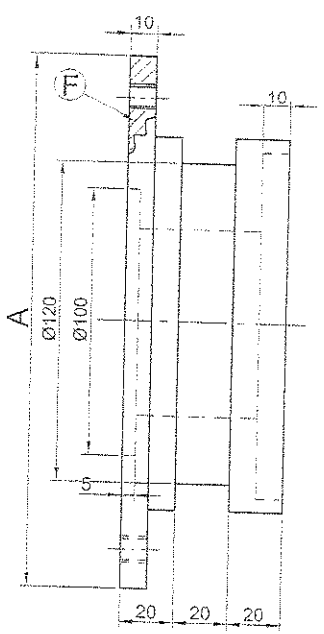
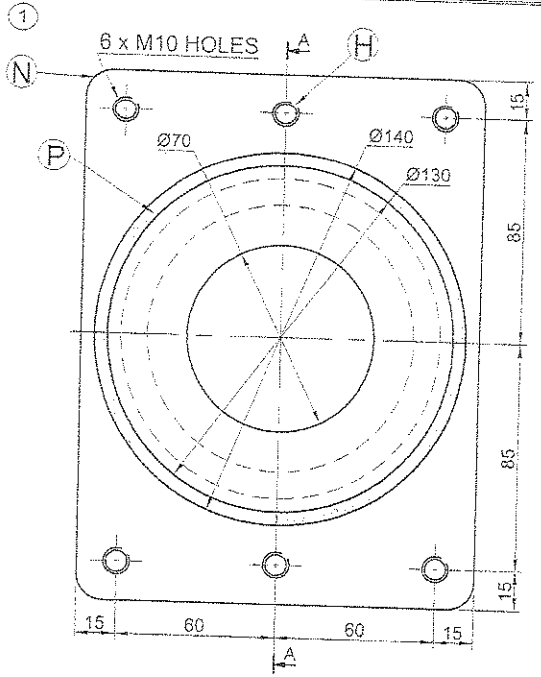
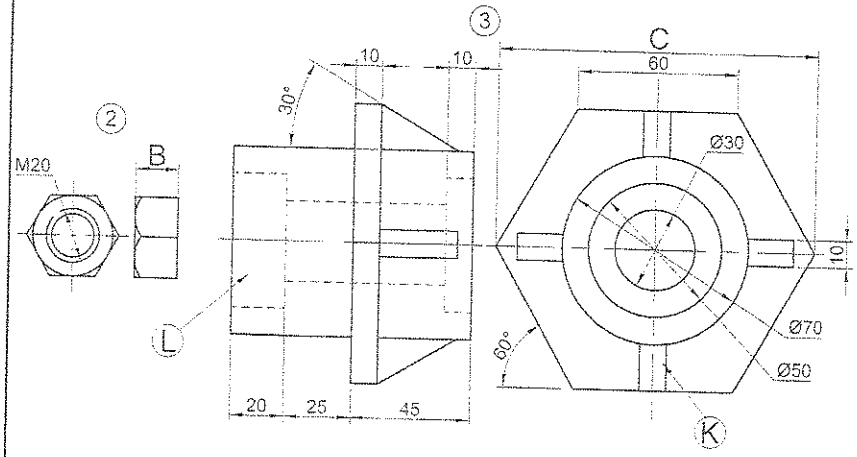
QUESTION 1
25 MARKS

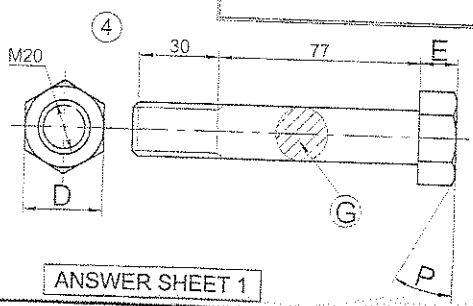
MECHANICAL ANALYTICAL









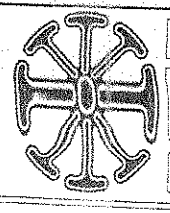


REFER TO THE INFORMATION GIVEN AND ANSWER THE FOLLOWING QUESTIONS

1.1 Describe the machining lay on the machining symbol?	
1.2 What is the roughness value on the machining symbol?	
1.3 What is the machining allowance on the machining symbol?	
1.4 What is the production method on the machining symbol?	
1.5 What is the depth of the M10 holes?	
1.6 How many M10 bolts are needed for the M10 holes?	
1.7 What is the dimension A on Part 1?	
1.8 What is the dimension B on Part 2?	
1.9 What is the dimension C on Part 3?	
1.10 What is the dimension D on Part 4?	
1.11 What is the dimension E on Part 4?	
1.12 What is the type of sectioning shown by F on Part 1?	
1.13 What is the type of sectioning shown by G on Part 4?	
1.14 What type of hole is shown by H on Part 1?	
1.15 What feature is shown by K on Part 3?	
1.16 What type of hole is shown by L on Part 3?	
1.17 What is the dimension P on Part 4?	
1.18 What is the feature N on Part 1?	
1.19 Which of the following machining symbols represents: "the removal of material is not permitted"? A ✓ B ▽ C ▽✓	
1.20 Which of the following machining symbols represents: "a CROSSED machining lay"? A ▽× B ▽c C ▽⊕	
1.21 What is the area of surface P (shaded surface) on Part 1? (2)	
1.22 Give 3 describing aspects of the given welding symbol?	

ANSWER SHEET 1

NAME



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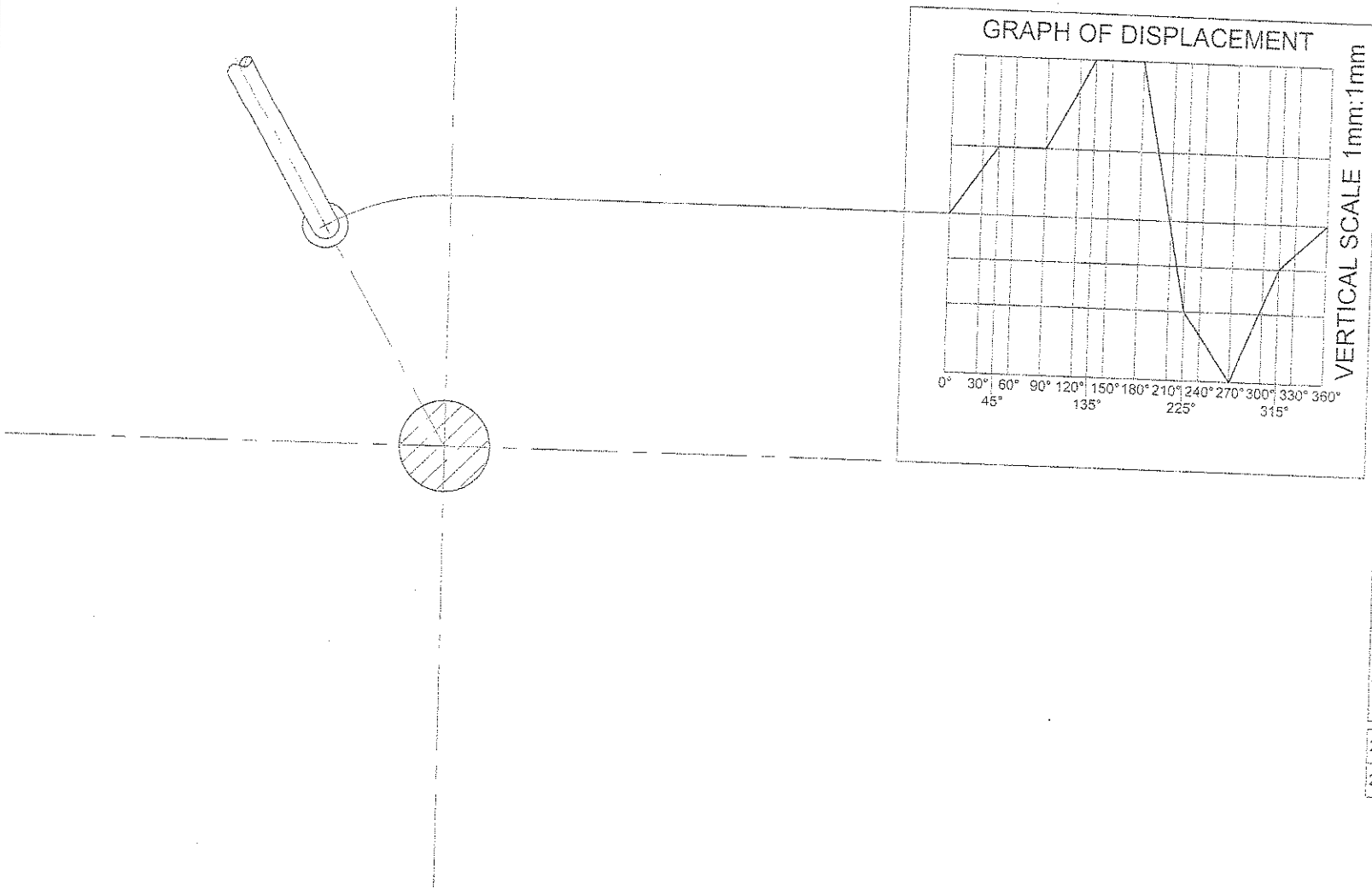
QUESTION 2a
20 MARKS

CAM PROFILE



The following details refer to a cam profile:

SPECIFICATIONS:
- Roller-ended follower
- Clockwise direction
- Roller diameter = 10mm

GIVEN:
- Cam shaft diameter = 20mm
- Minimum distance from the centre of the cam shaft to the profile = 15mm
- Graph of displacement
- Roller-ended follower drawn 30° off centre
- Centre lines through the cam shaft

REQUIREMENTS:
2a.1. Draw the cam profile for the given graph.
2a.2. Label horizontal scale, using 4mm guidelines.
2a.3. Show all construction.
2a.4. Show the direction.
2a.5. Answer the questions shown below, in the given table, based on the graph of displacement.
2a.5.1. What is the displacement at 225°?
2a.5.2. What is the travel at 225°?

ASSESSMENT CRITERIA

You will be assessed on your ability to do the following:

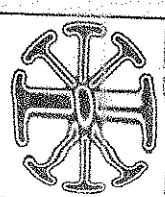
• plot the points for the cam profile	15
• answer the questions correctly	2
• draw a neat locus	1
• show all construction	1
• correctly label the horizontal scale	1

2a.5.1. What is the displacement at 225°?	
2a.5.2. What is the travel at 225°?	

Pts 15	
Ans 2	
Loc 1	
Con 1	
Scs 1	

ANSWER SHEET 2a

NAME



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QUESTION 2D
20 MARKS

MECHANISM

The figure below shows a water pump mechanism.

SPECIFICATIONS:

- Rod AB is attached to rod BC at B.
- Rod BC is attached to the anchor wheel at C.
- The anchor wheel rotates in a clockwise direction about point O.
- Point A is a fixed point that does not move.
- Rod AB pivots about point A.
- Point P lies on rod BC.
- Point B is a movable point that moves back and forth according to the mechanism movement.

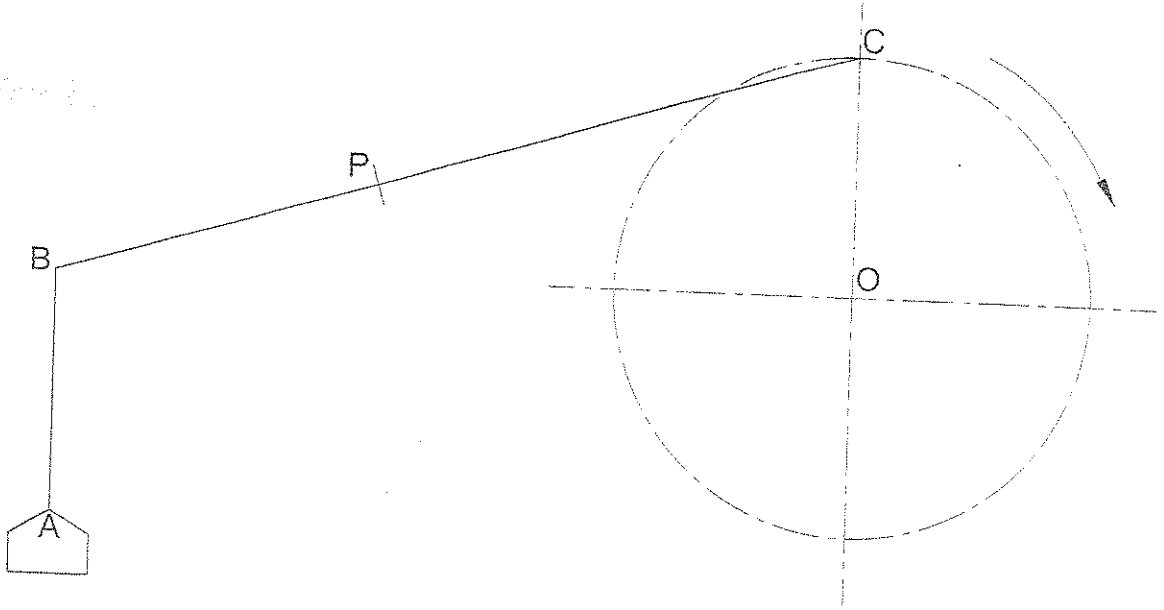
REQUIREMENTS:

2b.1. Draw the locus of point P.
2b.2. Show all construction

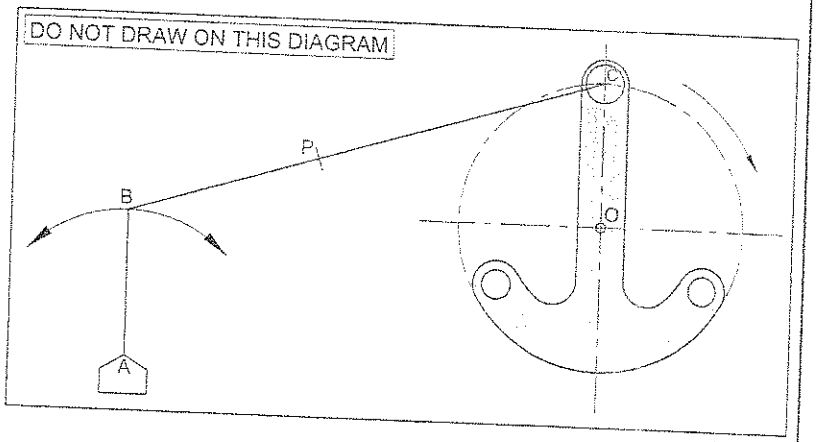
ASSESSMENT CRITERIA

You will be assessed on your ability to do the following:

• plot the points for the locus	11
• show all construction	6
• draw a neat locus	3



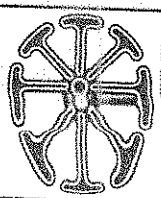
DO NOT DRAW ON THIS DIAGRAM



Pts
11
Con
3
Loc
1

ANSWER SHEET 2b

NAME



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QUESTION 3
40 MARKS

ISOMETRIC
PROJECTION

The figure below shows the front view, top view and right view of a Socket Plug, drawn in third angle orthographic projection. The nut is cut by a cutting plane A-A.

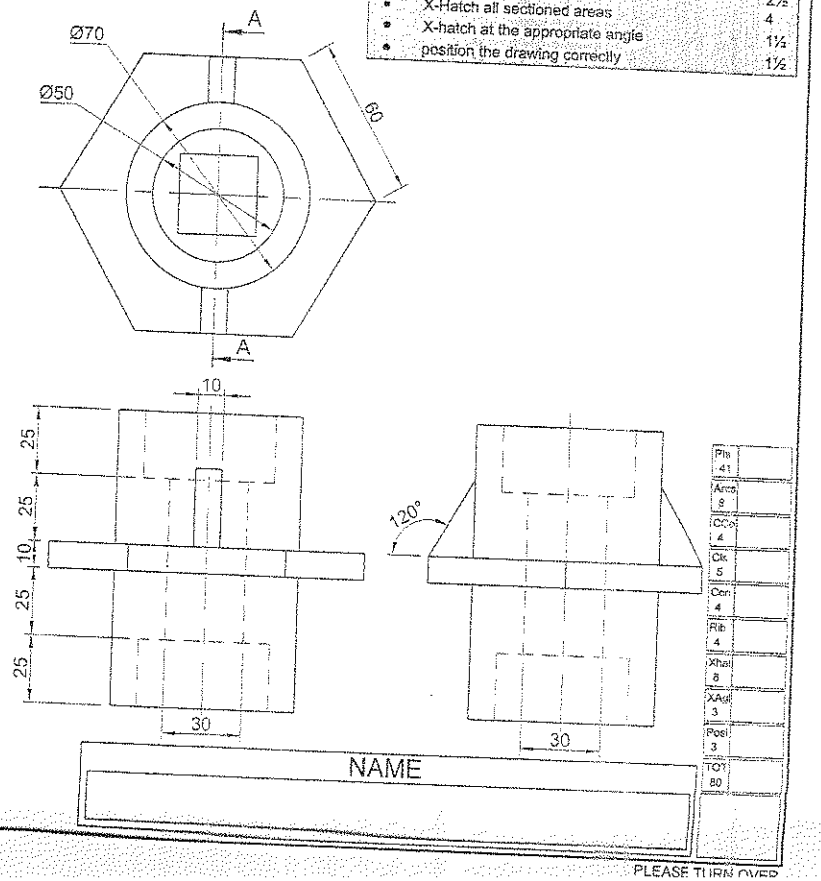
REQUIREMENTS:

- Use your instruments to draw a **Sectional Isometric** view of the casting, on the cutting plane A-A.
- Do **NOT** show hidden details.
- Show all construction.
- X-Hatch all the sectioned areas.
- Use scale 1:1.

ASSESSMENT CRITERIA

You will be assessed on your ability to do the following:

• draw the isometric view	22½
• draw the isometric circle arcs using construction	6
• draw the construction for the angles & hexagon	2
• draw all centre lines	2½
• X-Hatch all sectioned areas	4
• X-hatch at the appropriate angle	1¼
• position the drawing correctly	1½



NAME

ANSWER SHEET 3

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QUESTION 4
05 MARKS

MECHANICAL ASSEMBLY

Answer this question on **ANSWER SHEET 4**

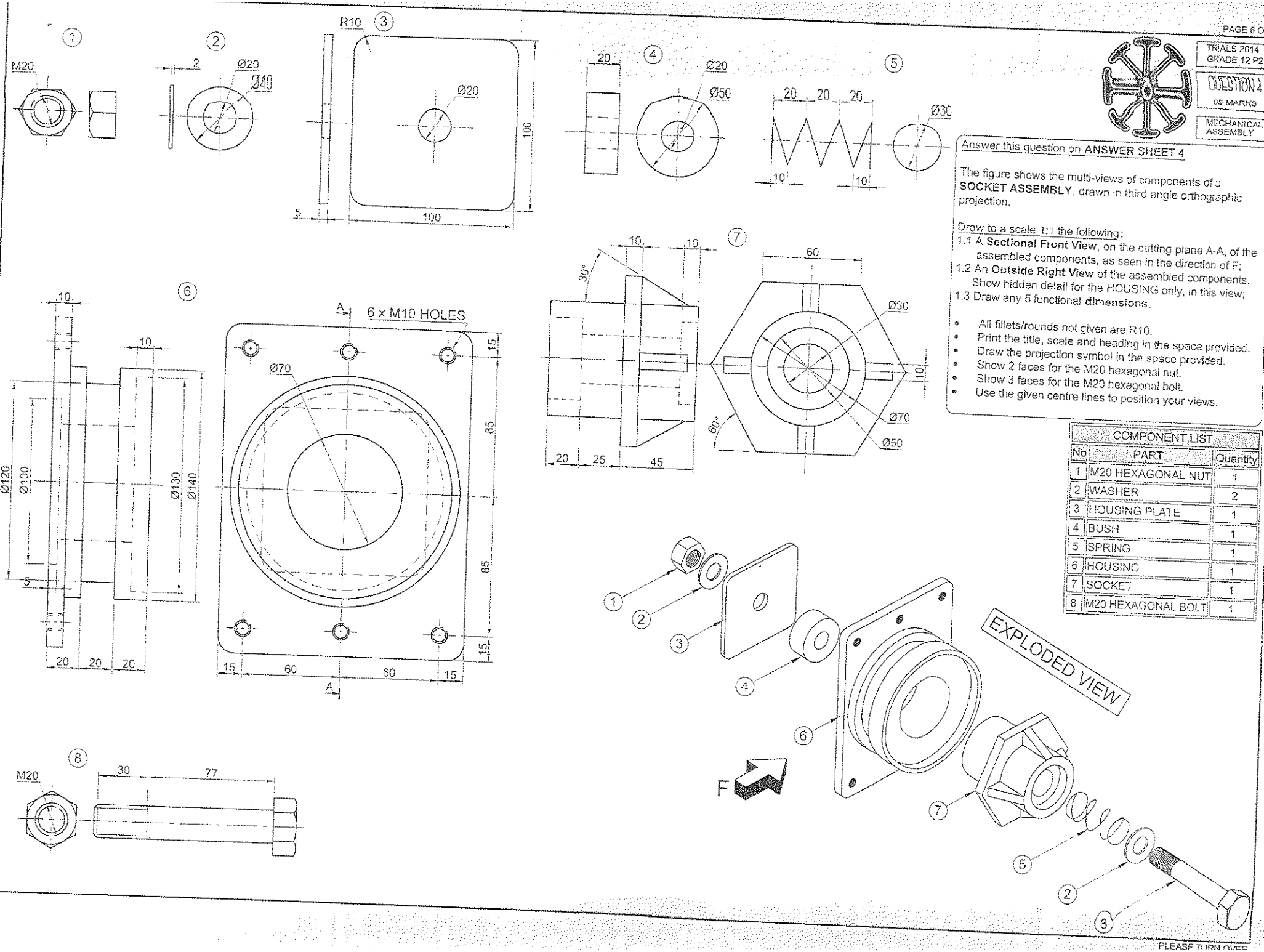
The figure shows the multi-views of components of a **SOCKET ASSEMBLY**, drawn in third angle orthographic projection.

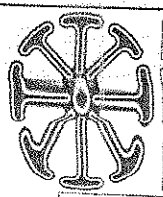
Draw to a scale 1:1 the following:

1.1 A **Sectional Front View**, on the cutting plane A-A, of the assembled components, as seen in the direction of F;
1.2 An **Outside Right View** of the assembled components. Show hidden detail for the HOUSING only, in this view;
1.3 Draw any 5 functional **dimensions**.

- All fillets/rounds not given are R10.
- Print the title, scale and heading in the space provided.
- Draw the projection symbol in the space provided.
- Show 2 faces for the M20 hexagonal nut.
- Show 3 faces for the M20 hexagonal bolt.
- Use the given centre lines to position your views.

COMPONENT LIST		
No	PART	Quantity
1	M20 HEXAGONAL NUT	1
2	WASHER	2
3	HOUSING PLATE	1
4	BUSH	1
5	SPRING	1
6	HOUSING	1
7	SOCKET	1
8	M20 HEXAGONAL BOLT	1





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QUESTION 4
85 MARKS

MECHANICAL ASSEMBLY

ASSESSMENT CRITERIA		
SECTIONAL FRONT VIEW		
Tit,Sca,Sym,Head	A	5
CENTRE LINES	B	2
SECTIONING	C	26
NO SECTIONING	D	22
M20 NUT	E	6
M20 BOLT	F	8
SPRING	G	7
HATCHING	H	26
THREAD	J	4
INT.THREAD.HAT	K	4
ASSEMBLY	L	9
POSITION VIEWS	M	4
TOTAL	123	
RIGHT VIEW		
CENTRELINES	N	12
HOUSING	O	16
SOCKET	P	16
M20 BOLT	Q	4
WASHER	R	2
HIDDEN DETAIL	S	12
DIMENSIONS	T	5
TOTAL	67	
TOTAL	190	
TOTAL	95	

TITLE:
SCALE:
HEADING:

PROJECTION
SYMBOL

ANSWER SHEET 4

NAME