



NATIONAL SENIOR CERTIFICATE

GRADE 12

ENGINEERING GRAPHICS AND DESIGN P2 NOVEMBER 2016

MARKS: 100 TIME: 3 hours

This question paper consists of 6 pages.

INSTRUCTIONS AND INFORMATION

- 1. This question paper consists of FOUR questions.
- 2. Answer ALL the questions.
- 3. ALL drawings are in third-angle orthographic projection, unless otherwise stated.
- 4. ALL drawings must be completed using instruments, unless otherwise stated.
- 5. ALL answers must be drawn accurately and neatly.
- 6. ALL the questions must be answered on the QUESTION PAPER as instructed.
- 7. ALL the pages, irrespective of whether the question was attempted or not, must be re-stapled in numerical sequence in the TOP LEFT-HAND CORNER ONLY.
- 8. Proper planning is essential in order to complete all the questions.
- 9. Print your examination number in the block provided on every page.
- 10. Any details or dimensions not given must be assumed in good proportion.

FOR OFFICIAL USE ONLY															
QUESTION	MARK	S OBTA	AINED	<u>1</u>	SIGN	MODERATED		ED	1/2	SIGN	RE-MARKING		NG	1/2	SIGN
1															
2															
3															
4															
TOTAL															
	2	0	0			2	0	0		_	2	0	0		

FINAL CONVERTED MARK	CHECKED BY
100	

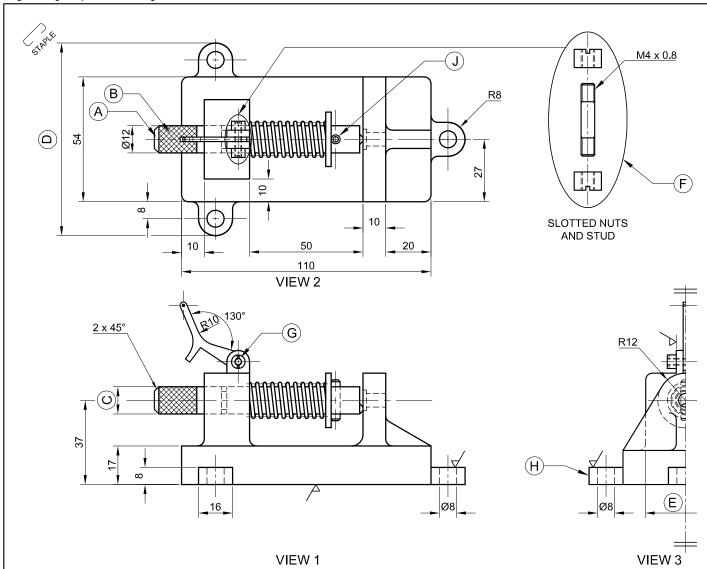
COMPLETE THE FOLLOWING:
CENTRE NUMBER
CENTRE NUMBER
EXAMINATION NUMBER
EXAMINATION NUMBER



Engineering Graphics and Design/P2

NSC

DBE/November 2016



ANSWER 17: Construction



				DRAWN: CARLOS	DATE: 201	5-10-12
	PA	RTS LIST		DRAWING PROGRAMME: AUTOCA	D 2016	
	PART	QUANTITY	MATERIAL	ALL UNSPECIFIED RADII ARE R3.		SCALE 1:1
1	BASE	1	CAST IRON	TOLERANCE ON ALL DIMENSIONS:	± 0,25 mm	
2	STRIKING PIN	1	STAINLESS STEEL	SURFACE TREATMENT		√=
3	COIL SPRING	1	SPRING STEEL	HOME SECURIT	V	1 ZIRK BAARD STREET PRETORIA
4	WASHER	1	STAINLESS STEEL	PRODUCTS	•	0001
5	DOWEL PIN	1	SPRING STEEL	PRODUCIS		www.homesecure.co.za
6	TRIGGER PLATE	1	STAINLESS STEEL	TITLE		
7	SLOTTED NUT	2	HIGH TENSILE STEEL	TRIGGER MECHA	NISM	
				1		

EN 21 STEEL

QUESTION 1: ANALYTICAL (MECHANICAL)

Given:

Three views of a trigger mechanism assembly, an enlarged view, a parts list, a title block and a table of questions. The drawings have not been prepared to the indicated scale.

Instructions:

Complete the table below by neatly answering the questions, which refer to the accompanying drawings and the title block. [30]

	QUESTIONS	ANSWERS		
1	What was Francu's responsibility?		1	
2	What drawing method was used to prepare the drawings?		1	
3	What scale is indicated for the drawing?		1	
4	What should all the unspecified radii be?		1	
5	What material is used to manufacture the striking pin?		1	
6	Name the type of finish at A.		1	
7	Name the type of finish at B.		1	
8	What is VIEW 3 called?		1	
9	Determine the complete dimensions at C:	D: E:	3	
10	How many parts make up the trigger mechanism assembly?		1	
11	What is the purpose of the enlarged view at F?		1	
12	How many surfaces need to be machined?		1	
13	What direction of lay must be applied to the machined surfaces?		1	
14	What is the screw thread specification of the stud nut at G?		2	
15	With reference to the tolerance, determine the maximum height of the feature at H.		2	
16	Referring to the parts list, identify the part at J.		1	
17	In the space above the parts list (ANSWER 17), complete th constructing the R10 fillet. Show ALL construction.	e view of the trigger plate by neatly	3	
18	In the space below (ANSWER 18), draw, in neat freehand, the	he convention for a coil spring.	3	
19	In the space below (ANSWER 19), draw, in neat freehand, thused.	he symbol for the projection system	4	
		TOTAL	30	

ANSWER 18: Convention for coil spring.

ANSWER 19: Projection symbol

EXAMINATION NUMBER

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QUESTION 2: LOCI

NOTE: Answer QUESTIONS 2.1 and 2.2.

2.1 MECHANISM

Given:

- A schematic drawing of a mechanism consisting of crank OA, connecting rod AB, swivel guide C, sliding rod DE, pin F and horizontal groove GH
- The position of centre point O on the drawing sheet

Specifications:

- The positions of O, C and groove GH are fixed
- Connecting rod AB is pin joined to crank OA at A
- Sliding rod DE is pin-joined to connecting rod AB at D
- Pin F is fixed to sliding rod DE
- AB = 120 mm
- DE = 120 mm
- AD = 40 mm
- DF = 40 mm



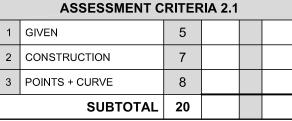
As crank OA rotates in a clockwise direction, connecting rod AB freely slides through swivel guide C.

Point E of sliding rod DE reciprocates along groove GH during the rotation.

Instructions:

- Draw, to scale 1:1, the given schematic drawing of the mechanism.
- Trace the locus generated by point F for ONE complete rotation of crank OA.

Show ALL necessary construction.



2.2 AUGER (HELIX)

Given:

- The incomplete front view and the left view of an auger with PQ indicating the starting position
- The position of centre point R on the drawing sheet

Specifications:

: 60 mm Pitch

• Turns : ONE AND A HALF • Direction : Right-handed

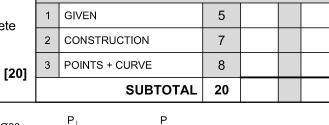
Instructions:

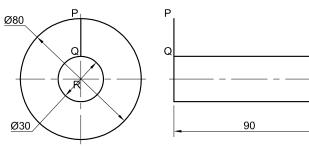
Draw, to scale 1: 1, the given left view and the complete front view of the auger.

• Show ALL necessary construction.

• No hidden detail is required.







]	3
	1

	ASSESSMENT CRITERIA 2.2						
1	GIVEN + CENTRE LINES	4					
2	CONSTRUCTION	6					
3	OUTSIDE HELIX + CURVE QUALITY	8					
4	INSIDE HELIX + SHAFT	4					
	SUBTOTAL 2.2	22					
	SUBTOTAL 2.1	20					
	TOTAL	42					
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QUESTION 3: ISOMETRIC DRAWING

Given:

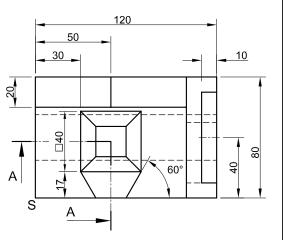
- The front view, top view and left view of a jig
- The position of point S on the drawing sheet

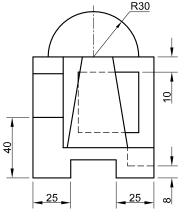
Instructions:

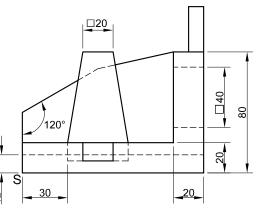
Using scale 1: 1, convert the orthographic views of the jig into a sectional isometric drawing on cutting plane A-A.

- Make S the lowest point of the drawing.
- Show ALL necessary construction.
- NO hidden detail is required.

[40]



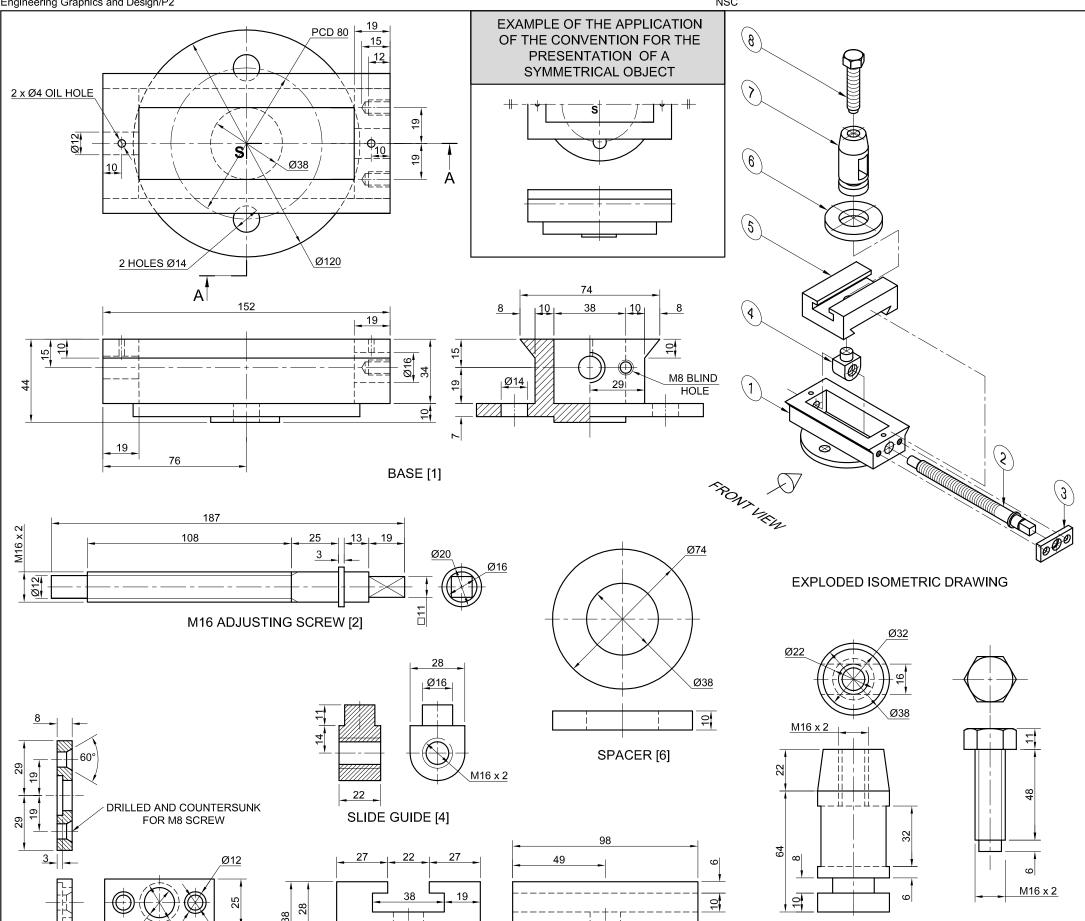




		_ 1				
1	AUX. VIEW + PLACING	$2\frac{1}{2}$				
2	ISOMETRIC + NON-ISOMETRIC LINES	23				
3	SECTIONED SURFACES	9				
4	ISOMETRIC CIRCLES + CIRCLE CONSTR'	5 ½				
	TOTAL	40				
	EXAMINATION NUMBER					

EXAMINATION NUMBER

ASSESSMENT CRITERIA



QUESTION 4: MECHANICAL ASSEMBLY

Given:

- Orthographic views of each of the parts of a tool holder assembly
- An example of the application of the convention for the drawing of a symmetrical object
- The exploded isometric drawing of the parts of the tool holder assembly, showing the position of each part relative to all the others
- The top view centre line and reference point **S** on page 6

Instructions:

- Answer this question on page 6.
- Using the given centre line and reference point S, draw, to scale 1: 1 and in third-angle orthographic projection, the following views of the assembled parts of the tool holder assembly:
- **4.1 A half sectional front view** on cutting plane A-A. Show the right side in section, as seen from the direction of the arrow shown on the exploded isometric drawing. The cutting plane is shown on the top view of the base (part 1).
- **4.2** The top view. Show only the front half of the top view by applying the convention for the presentation of a symmetrical object.

NOTE:

- Planning is essential.
- ALL drawings must comply with the guidelines as contained in the SANS 10111.
- Apply the convention of symmetry only to the top view.
- Show THREE faces of the M16 bolt (part 8) in the front view.
- In this drawing the M16 bolt (part 8) must be completely screwed into the tool holder (part 7).
- Add cutting plane A-A.
- NO hidden detail is required.

[88]

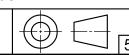
	PARTS LIST						
	PARTS	QUANTITY	MATERIAL				
1	BASE	1	CAST STEEL				
2	M16 ADJUSTING SCREW	1	MILD STEEL				
3	PLATE	1	MILD STEEL				
4	SLIDE GUIDE	1	MILD STEEL				
5	SLIDE BLOCK	1	CAST IRON				
6	SPACER	1	MILD STEEL				
7	TOOL HOLDER	_1	MILD STEEL				
8	M16 BOLT	1	MILD STEEL				
	13 BALLACK STREET						



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TOOL HOLDER

ALL DIMENSIONS ARE IN MILLIMETRES.



Please turn over

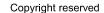
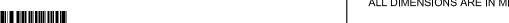


PLATE [3]



M16 BOLT [8]

TOOL HOLDER [7]

9

Ø16

SLIDE BLOCK [5]

FOR OFFICIAL USE ONL	Y	
INCORRECT SCALE		
INCORRECT HATCHING		
PARTS NOT ASSEMBLED		
TOTAL		

	ASSESSMENT CRITERIA							
	TOP VIEW							
		POSSIBLE	OBTAINED	SIGN	MODERATED			
1	BODY	5 ½						
2	ADJUSTING SCREW	6						
3	PLATE	1						
4	SLIDE BLOCK	2 ½						
5	SPACER	1/2						
6	TOOL HOLDER	1						
7	M16 BOLT	$2\frac{1}{2}$						
	SUBTOTAL	19						
SECTIONAL FRONT VIEW								
1	BODY	13						
2	ADJUSTING SCREW	10						
3	PLATE	3						
4	SLIDE GUIDE	$3\frac{1}{2}$						
5	SLIDE BLOCK	4 ½						
6	SPACER	3						
7	TOOL HOLDER	10						
8	M16 BOLT	8						
	SUBTOTAL	55						
	GENER	RAL						
1	CENTRE LINES	3						
2	CUTTING PLANE	4						
3	ASSEMBLY	7						
	SUBTOTAL	14						
	TOTAL	88						
PEN	NALTIES (-)							
	GRAND TOTAL							
	EXAMINATION NUMBER							
	EXAMINATION NUMBER 6							

