

basic education

Department: **Basic Education REPUBLIC OF SOUTH AFRICA**

NATIONAL SENIOR CERTIFICATE

GRADE 12

ENGINEERING GRAPHICS AND DESIGN P2 NOVEMBER 2011

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.
- otherwise.
- 4. ALL drawings must be drawn to scale 1 : 1, unless stated otherwise.
- whether the question was attempted.
- 7. Time management is essential in order to complete all the questions.
- 8. Print your examination number in the block provided on every page.
- 10. ALL answers must be drawn accurately and neatly.

FOR OFFICIAL USE ONLY											
QUESTION	MARK	(S OBT/	AINED	1⁄2	SIGN	MC	DERAT	ED	1⁄2	SIGN	
1											
2											
3											
4											
TOTAL											
	2	0	0			2	0	0			



100

CC	MPLETE THE FOLLOWING:	
	CENTRE NUMBER	
	CENTRE NUMBER	
	EXAMINATION NUMBER	
	EXAMINATION NUMBER	



3. ALL drawings are in third-angle orthographic projection, unless stated

5. ALL the questions must be answered on the QUESTION PAPER as instructed. 6. ALL the pages must be restapled in numerical sequence, irrespective of

9. Any details or dimensions not given, must be assumed in good proportion.

ARK	CHECKED BY

Please turn over

Engineering Graphics and Design/P2

30

A/F79

___|__<u>Ø8</u>

STAPLE

NSC

Given:

THREE detailed views of a swing check valve, a detailed drawing of the screw pin and plug, a title block and a table of questions. The drawings have not been prepared to the indicated scale.

Instructions:

ANSWER 20

SYMBOL

	QUESTIONS ANSWERS			
1	When was the drawing checked?	1/2		
2	Who approved the drawing?	1/2		
3	What scale is indicated for the drawing?	1/2		
4	Who was responsible for the revisions?	1/2		
5	How many revisions have there been to the drawing?	1/2		
6	What was the nature of the first revision?	1/2		
7	How many surfaces require machining?	1		
8	What is the roughness value of the machined surfaces?	1		
9	Name the circled feature at 1.	1		
10	Name the component at 2.	1		
11	In ONE word, describe the true shape of the feature at 3.	1		
12	What type of section is shown at 4?	1		
13	What thread size must a component have in order to be coupled to the swing check valve?	1		
14	How many components make up the swing check valve?	1		
15	What would view 3 be called?	1		
16	Determine the dimensions at: A B C D E	5		
17	Draw the cutting plane A-A on view 2.	3		
18 In view 1, trace the locus that will be generated by point P as the gate opens to its maximum.				
19	In the box below (ANSWER 19), draw, in neat freehand, the symbol for the projection system used.	4		
20	In the box below (ANSWER 20), complete, in neat freehand and according to the SABS 0111 conventions, the drawing of the inspection plug on the right.	4		
	TOTAL	30		

				-	SCF Ø19 Ø70		<u>4</u>)	
	-	190	-	SCREW	PIN AND	PLUG	1	When was the dra
		VIEW 2					2	Who approved the
		B					3	What scale is indic
							4	Who was respons
	`		L		Ţ.	l l	5	How many revision
INSPECT PLUG -			(6	What was the natu
			A	1)			7	How many surface
					\leftarrow		8	What is the rough
			\mathbb{M}				9	Name the circled f
						166	10	Name the compon
Ø79	W13			$\widehat{2}$			3) 11	In ONE word, desc
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							13	What thread size r swing check valve
		Ç/			Ý	,	14	How many compo
	_	130 D		- A	/F97	-	15	What would view 3
	I	VIEW 1	I	VI	EW 3		16	Determine the dim
							17	Draw the cutting p
							18	In view 1, trace the
2011-08-12	N BOOTH	LENGTHEN INSPECTION PLUG	3]			19	In the box below (/
2011-08-09	N BOOTH	SHOW MACHINED SURFACES	2	1			20	In the box below (
2011-08-05	N BOOTH	REMOVE WASHER	1				20	drawing of the insp
DATE	REVISED BY	REVISION DESCRIPTION	Nº					
DRAWING	No. 60305	MATERIAL: BRONZE						
	E: SCV 15-10	HEAT TREATMENT: NORMALISE		ALL DIMENSIONS AF	RE IN MILLIME	TRES.		ANSWER 19
	, TOLERANCES ON	DRAWING PROGRAMME: AUTOCAD	2011	DRAWN BY: S SHAB		2011-07-22		
DIMENSION	NS ARE ± 0,25.	ALL UNSPECIFIED RADII ARE R2.	TOFET	CHECKED BY: S PIE		2011-07-24		
	MECH	TECH 17 LONG S' NEW PA KIMBERLE	ARK	APPROVED BY: A M		2011-08-03		
		ERING www.mtech	1.co.za	SCALE: 1 : 2				
			5 7820					

0,8

SWING CHECK VALVE

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TITLE

QUESTION 1: ANALYTICAL (MECHANICAL)

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

EXAMINATION NUMBER

EXAMINATION NUMBER

Please turn over

2

STAPLE

2.1 AUGER

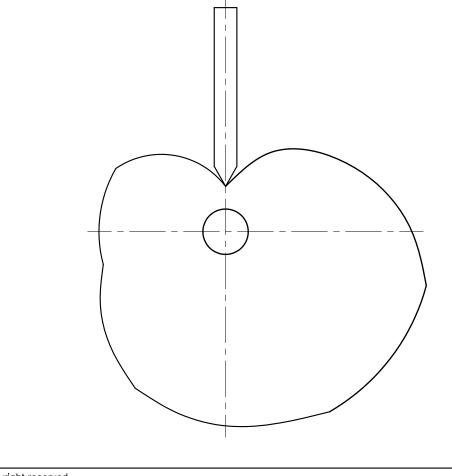
Given:

- the answer

Instructions:

2.2 CAM Given:

Instructions:



+



QUESTION 2: LOCI

NOTE: Answer QUESTIONS 2.1 AND 2.2.

• The front view and left view of the shaft of an auger • A reference point, labelled O, to help with the placement of

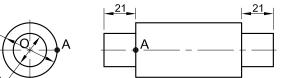
Specifications:

• The pitch (ONE full turn) is 35 mm. • The outer diameter of the auger is Ø80.

• Starting at point A, draw, to scale 1 : 1, TWO turns of a right-hand auger on the given views of the shaft.

- Show ALL necessary construction.
- NO hidden detail is required.

[27]



ASSESSMENT CRITERIA							
GIVEN	5						
CENTRE LINES + CONSTR'	5						
HELIX/AUGER	17						
SUBTOTAL	27						

A cam profile with a wedge-ended follower

Specifications:

The cam rotates with constant velocity in a clockwise direction, imparting uniform motion to the follower.

• Draw the displacement graph for the cam, using a horizontal scale of 8 mm equal to 30°.

• Indicate the direction of rotation on the cam profile.

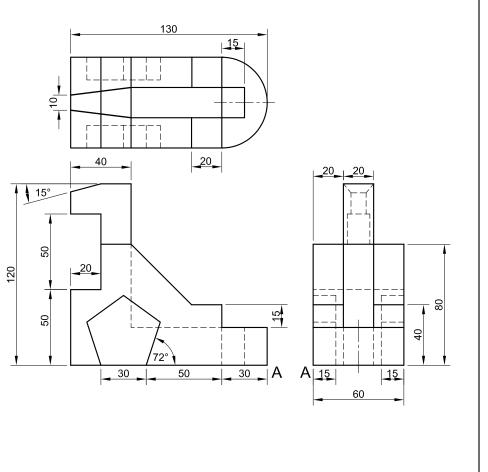
• Label the displacement graph and indicate the scale used. • Show ALL necessary construction. [12]

ASSESSMENT CRITERIA								
DISPLACEMENT GRAPH	7							
CONSTRUCTION	3							
LABELS + ARROW	2							
SUBTOTAL	12							
TOTAL	39							
EXAMINATION NUMBER								
EXAMINATION NUMBER								

10

STARLE

Given:







QUESTION 3: ISOMETRIC DRAWING

• The front view, top view and right view of a safety clip with TWO regular pentagonal slot holes • The position of point A on the drawing sheet

Instructions:

Using scale 1 : 1, convert the orthographic views of the safety clip into an isometric drawing.

• Make A the lowest point of the drawing. • Show ALL necessary construction. • NO stencils may be used.

• NO hidden detail is required.

[40]

ASSESSMENT CRITERIA								
AUXILIARY VIEWS + CIRCLE CONSTRUCTION + PLACE	6							
ISO' ARCS + PENTAGONAL HOLE	11							
ISO' + NON-ISO' LINES	23							
TOTAL	40							
EXAMINATION NUMBER								
EXAMINATION	NUMBE	R			4			

Given:

Ø10

Ø14

Ø10

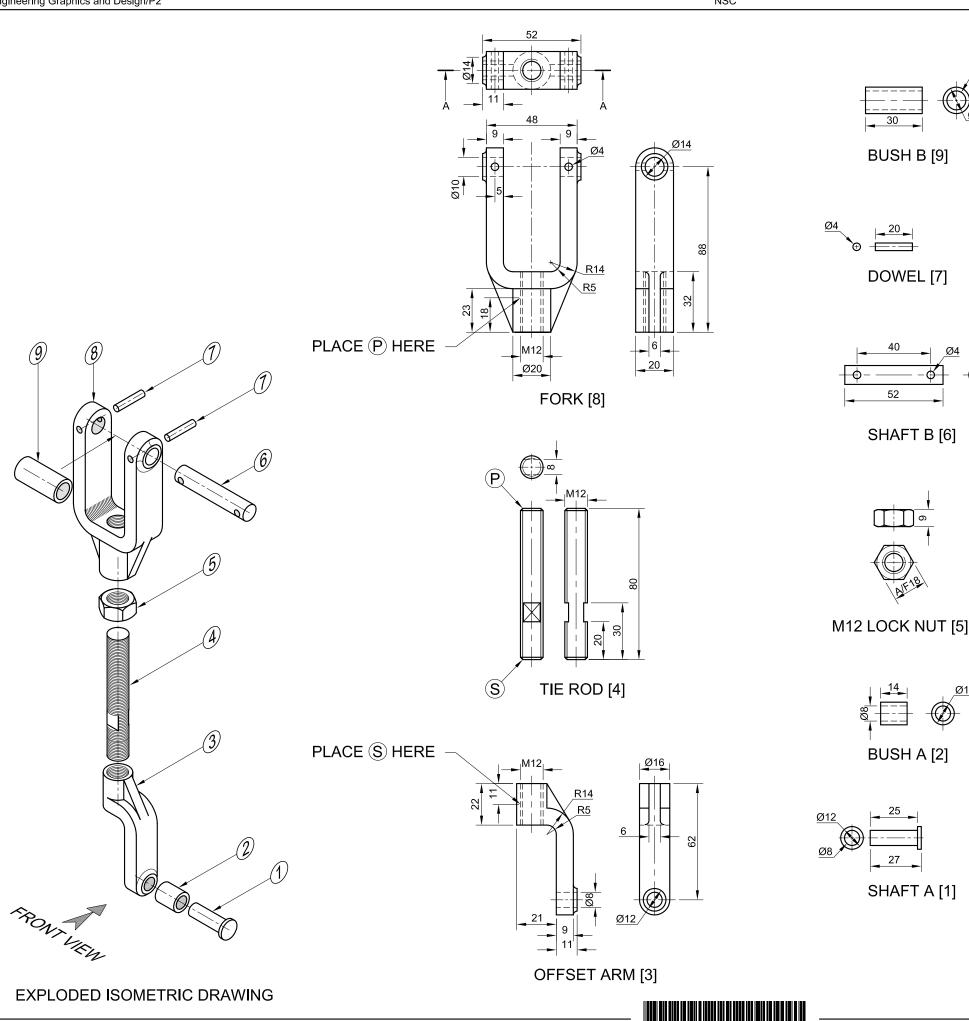
all the others

Instructions:

- SABS 0111.

NOTE:

1. SHAF
2. BUSH
3. OFFSI
4. TIE RO
5. M12 L
6. SHAF
7. DOWE
8. FORK
9. BUSH
K
OF
ALL DIN IN MILL



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QUESTION 4: MECHANICAL ASSEMBLY

• The exploded isometric drawing of the parts of an offset connecting bar, showing the position of each part relative to

• Orthographic views of each of the parts of the offset connecting bar assembly

• Answer this question on page 6.

• Draw, to scale 1 : 1 and in third-angle orthographic projection, the following views of the assembled parts of the offset connecting bar assembly:

4.1 A sectional front view on cutting plane A-A, as seen from the direction of the arrow shown on the exploded isometric drawing. The cutting plane, which passes vertically through the centre of the assembly, is shown on the top view of the fork (part 8).

4.2 The right view

• ALL drawing must comply with the guidelines contained in the

• As indicated, place point P on the upper end of the tie rod with point P on the fork and point S on the lower end of the tie rod, with point S on the offset arm.

• Show THREE faces of the nut in the front view and ALL necessary construction.

• NO hidden detail is required.

Add the following features to the drawing:

• The cutting plane A-A

• Label the sectional view SECTION A-A.

[91]

QUANTITY	MATERIAL						
	MATERIAL						
1	MILD STEEL						
1	BRONZE						
1	CAST IRON						
1 MILD STEEL							
CK NUT 1 MILD STEEL							
1	MILD STEEL						
2	MILD STEEL						
1	CAST IRON						
1	BRONZE						
MECHTECH ENGINEERING							
FSET CONNECTING BAR							
L UNSPECIFIEI DII ARE R2.							
	1 1 1 2 1 1 1 HTECI INEERING						

STATE



ASSESSMENT CRITERIA									
SECTIONAL FRONT VIEW									
1	SHAFT A	2							
2	BUSH A	1							
3	OFFSET ARM	71/2							
4	TIE ROD	9							
5	M12 NUT	8							
6	SHAFT B	2							
7	DOWEL	1							
8	FORK	101⁄2							
9	BUSH B	1							
н	HATCHING	12							
:	SUBTOTAL	54							
		RIGHT	VIEW						
3	OFFSET ARM	51/2							
4	TIE ROD	5							
5	M12 NUT	41/2							
8	FORK	6							
(SUBTOTAL	21							
		GENE	RAL						
1	CENTRE LINES	4							
2	CUTTING PLANE + TITLE	5							
3	ASSEMBLY	7							
	SUBTOTAL	16							
	TOTAL	91							
	E	XAMINATIC	N NUMBER						
						_			
EXAMINATION NUMBER 6									