NATIONAL SENIOR CERTIFICATE EXAMINATION
2013

ENGINEERING GRAPHICS AND DESIGN
PAPER 2

MARKS: 200
TIME: 3 HOURS

PLEASE READ THE FOLLOWING INSTRUCTIONS CAREFULLY

1. This question paper consists of 7 pages including the cover page and 4 questions.
2. All the 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 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 examination number neatly on each page.
8. Use only the drawing sheets provided.
9. Your drawings should be well presented and reflect neatness and accuracy. Marks will be deducted for untidy and inaccurate work.
10. Any dimensions or detail not given may be assumed in good proportion.
11. Stencils and Calculators may be used.

FOR OFFICIAL USE ONLY

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FINAL CONVERTED MARK

100

CHECKED BY

EXAMINATION NUMBER

PLEASE TURN OVER
Complete the following questions by writing the correct answer in the space provided:

1.1 The feature 'A' in Figure A represents a

1.2 The length of the thread in Figure A is

1.3 The feature 'B' in Figure B represents a

1.4 What type of hole is shown at 'C' in Figure B?

1.5 What is the dimension 'M' in Figure C?

1.6 The feature 'D' on the shaft (Figure C) is a

1.7 What type of machine part is shown in Figure D?

1.8 The feature 'E' on Figure E represents a

1.9 The feature 'F' on Figure E represents a

1.10 What type of key is shown in Figure F?

1.11 Calculate the thickness 'X' of the nut (Figure G)

1.12 How many surfaces must not be machined on Figure H?

1.13 What is the roughness value of the parts milled in a circular pattern lay on Figure H?

1.14 Will the machine part (Figure I) be welded on site or off site?

1.15 With which process will the weld be finished (Figure I)?

15 MARKS
Given are the incomplete displacement graph (in position) and the starting point of a wedge-ended follower that reciprocates with uniform velocity. Complete the graph and then draw the locus of the cam to the following specifications:

- The direction of turn is clockwise.
- The camshaft has a diameter of 28 mm.
- For the first 60°, the follower falls 20 mm (given).
- For the next 60°, the follower is in dwell.
- For the next 60°, the follower falls 25 mm.
- For the next 60°, the follower is in dwell.
- For the next 30°, the follower falls 15 mm.
- For the next 30°, the follower rises 15 mm.
- For the next 15°, the follower is in dwell.
- For the next 15°, the follower rises 25 mm.
- For the next 15°, the follower is in dwell.
- During the last 15° it returns to its original position.

Instructions:

- Label the Displacement Graph, vertical scale and horizontal scale.
- Label the Cam Profile.
- Indicate the Direction.
- Show all constructions.

Answer the following related questions:

2a.1 What is the travel after 180°?
2a.2 What is the total travel?
2a.3 What is the displacement after 300°?
2a.4 What is the maximum displacement?

ASSESSMENT CRITERIA

- Complete graph
- Plot Points
- Locus
- Hatch shaft
- Direction
- Labels
- Accuracy: 4
- Lw/AccPt: -2

GPH

PTS

LOC

HAT

DIRE

LAB

ANS

JAJP

30 MARKS

EXAMINATION NUMBER

ANSWER SHEET 2a
The given figure shows a wheel, rotating around the centre O, with a rod attached to it at point R. The rod is free to slide through a pivoting mechanism between point A and E. Construct and draw the locus of point P if:

- The direction of rotation is clockwise.
- Show all constructions.

**Assessment Criteria**

- Setup: 2
- Plot Points: 1
- Locus: 2
- Lin/Arc/Pr.: -2

15 MARKS
The figure below shows 3 views of a heavy duty CASTING.

- Complete a neat, sectioned isometric drawing using the cutting plane A-A.
- Show all constructions and centre lines.
- Start your drawing on the given crosshairs.
- The pentagon is centrally positioned in line with the circle.
Figure 2 shows a series of pictures of a V-BLOCK and CLAMP, as well as an exploded view of how the components of a similar, simplified system are assembled. Components D to I were removed from a vehicle as a sub-assembly and will be clamped in the V-Block to make a small modification on it.

Figure 1 shows the different components that need to be assembled.

Complete the following to a SCALE of 1:1:

1.1 A Right View of the assembled components.
1.2 A Sectioned Front View of the assembled components to the cutting plane A-A.
1.3 Draw the bearing using the correct SANS 111-1 drawing convention.
1.4 Show the Hidden Detail on the Right View of only the V-groove of the Pulley (Part F), and the Clamp (Part B).
1.5 Insert 3 Important, functional Dimensions.
1.6 Draw the Projection Symbol.
1.7 Add a suitable Title and indicate the Scale used.
1.8 Label the Sectioned View.

COMPONENT LIST

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