T1320**(E)**(A8)T

NATIONAL CERTIFICATE

PLATERS' THEORY N2

(11022182)

8 April 2019 (X-Paper)
09:00–12:00

This question paper consists of 7 pages.

DEPARTMENT OF HIGHER EDUCATION AND TRAINING
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE
PLATERS' THEORY N2
TIME: 3 HOURS
MARKS: 100

INSTRUCTIONS AND INFORMATION

1.   Answer ALL the questions.

2.   Read ALL the questions carefully.

3.   Number the answers according to the numbering system used in this question paper.

4.   Sketches must be large, neat and fully labelled.

5.   Freehand drawing must be done in pencil.

6.   Write neatly and legibly.

QUESTION 1: MACHINES

1.1 FIGURE 1 below, shows a pedestal drilling machine. Name the components A–E by writing only the name next to the letter (A–E) in the ANSWER BOOK. (5)
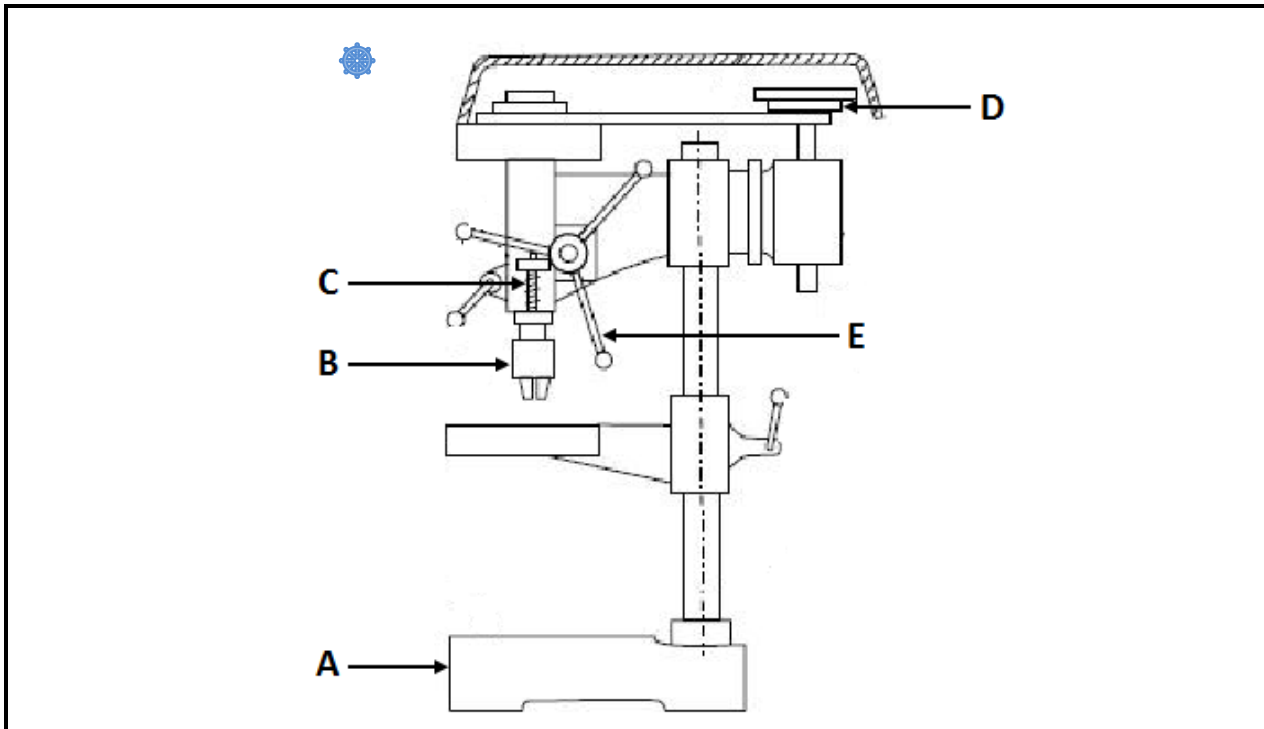
FIGURE 1

1.2 Name TWO safety precautions to be taken into account when working with a punching machine. (2)

1.3 Briefly describe the working principle of the cropper on a punch and shearing machine. (3)

[10]

QUESTION 2: ROLLING AND BENDING

2.1 The heel diameter of a 60 × 60 × 6 mm external angle-iron ring is 196 cm.

Calculate the length in millimeters of angle-iron to form the ring by using the formula given bellow:

$L = [D + T + (T \div 3)] \times 3.142$
Where: L = Length of the angle-iron
       D = Heel diameter of the angle-iron
       T = thickness of an angle-iron (5)

2.2   FIGURE 2 below, shows a top view of an angle iron frame.

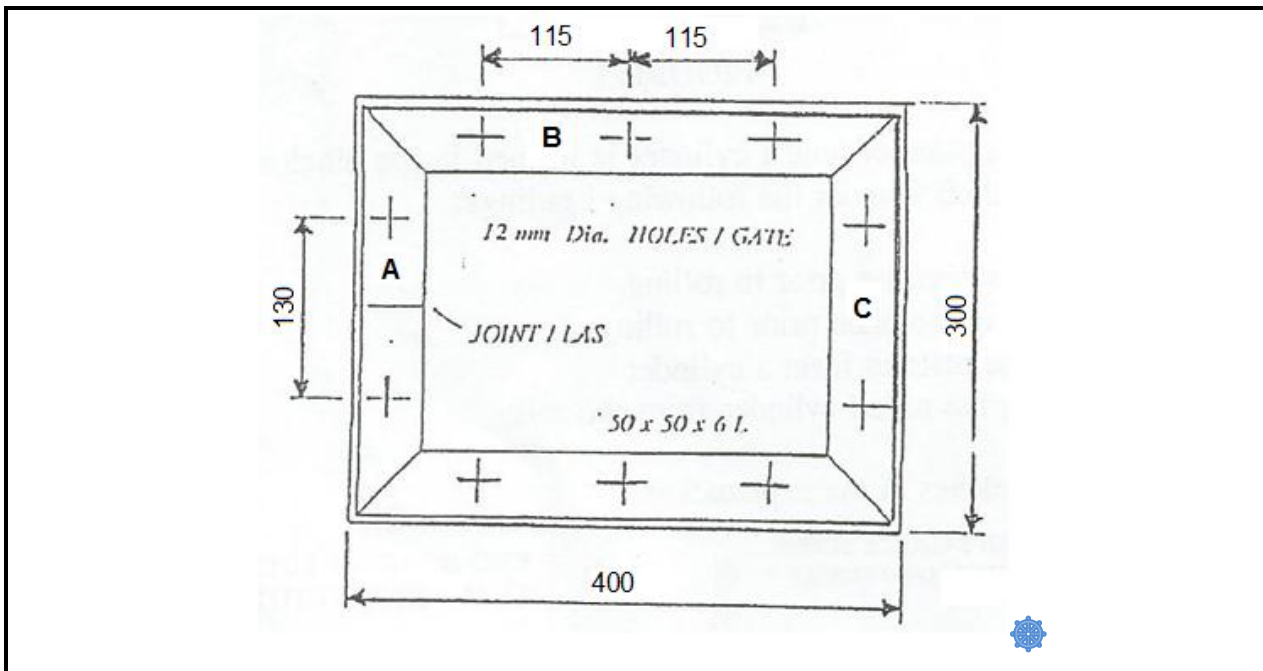Calculate the length of the angle-iron required to manufacture the frame.

FIGURE 2   (5)
                                                                        [10]

QUESTION 3: JOINING OF ROLLED STEEL SECTION

3.1   Describe the purpose of an assembly jig.   (3)

3.2   Name THREE requirements with which a well-designed welding jig should
        comply.   (3)

3.3   FIGURE 3 below, shows two plate edges with a wide gap between them.

        Describe, with the aid of sketch, a simple device made from scrap metal
        available in the workshop to bring together the plate edges closer for welding.   (4)
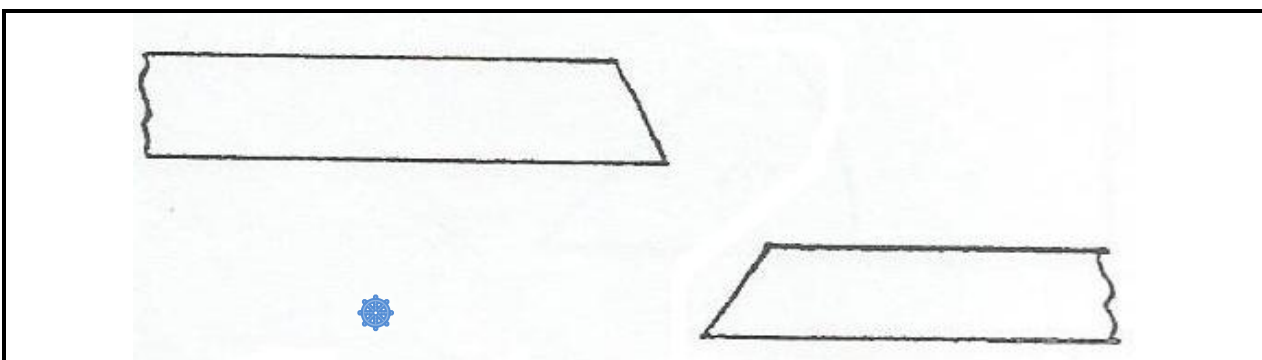

FIGURE 3   **[10]**

QUESTION 4: GENERAL PIPE WORK

4.1 FIGURE 4 below shows a center finder. Name the parts A–D by writing only the name and the use of each part next to the letter (A–D) in the ANSWER BOOK.
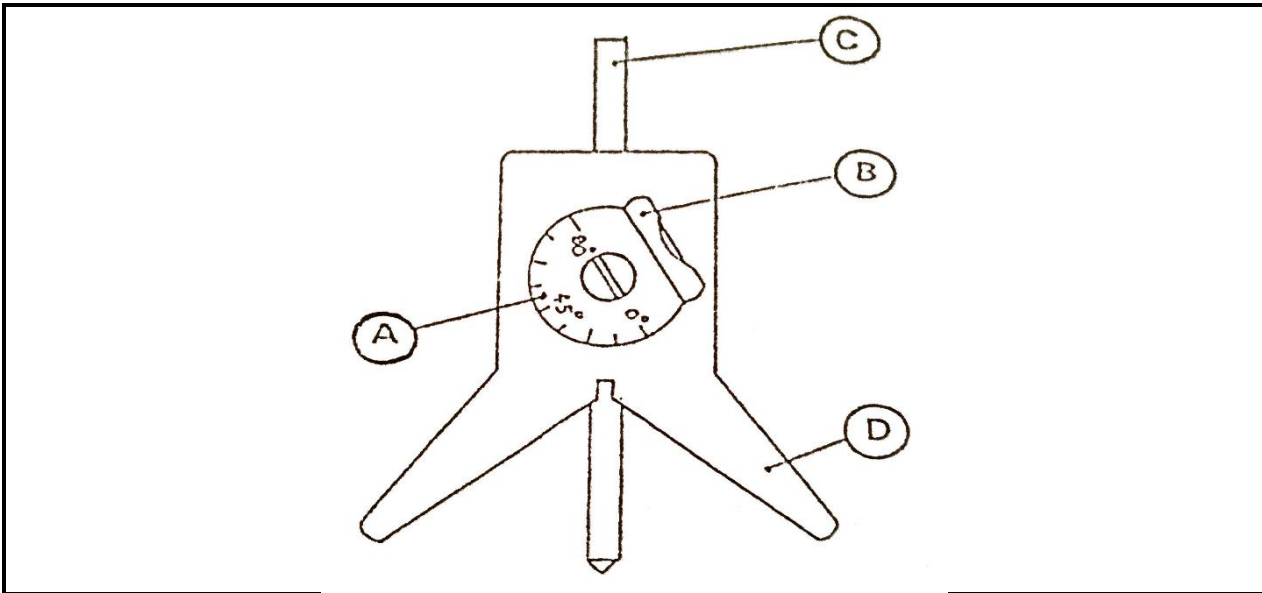

FIGURE 4 (4)

4.2 Describe with the aid of a free hand drawing, how to determine the 'saddle depth' of a T-piece of unequal diameter pipes. (4)

[8]

QUESTION 5: STEEL STRUCTURES

5.1 The span of a simple roof truss is 8 meter and the rafter is 4.472 meter.

Calculate the following:

5.1.1 Rise (3)

5.1.2 Pitch (3)

[6]

QUESTION 6: TEMPLATES

6.1 List FOUR information items that should be indicated on the template. (4)

6.2 Name two uses of template. (2)

[6]

QUESTION 7: METALS

7.1 Briefly describe the difference between ferrous and non-ferrous metals. (2)

7.2 Indicate whether the following statement is TRUE or FALSE next to question 7.2 In the ANSWER BOOK.

Manganese improves grain structure, corrosion resistance and magnetic properties. (1 × 2) (2)

7.3 Write TWO effects on steel when separately alloyed with each of the following elements:

    7.3.1 Nickel (2)

    7.3.2 Vanadium (2)

        [8]

QUESTION 8: GAS WELDING AND CUTTING

8.1 Briefly describe the effect of the following on the quality of a gas cut surface:

    8.1.1 Pre-heating flame too low

    8.1.2 Nozzle too far from surface

    8.1.3 Pre-heating flame too high

    8.1.4 Irregular torch travel

        (4 × 2) (8)

8.2 Briefly describe the TWO effects on the quality of a gas cutting on the surface, if the nozzle is too high from the surface. (2)

8.3 Briefly explain what is meant by 'brazing'. (2)

        [12]

QUESTION 9: ARC WELDING

9.1 Sketch a compound welding symbol large enough to show the following elements clearly:

    9.1.1 Double-V butt weld symbol (2)

    9.1.2 Arrow (1)

    9.1.3 Reference line (1)

    9.1.4 Symbol for machine finish (1)

    9.1.5 Tail (1)

9.2 Define the term *undercut*. (3)

9.3 Name SIX causes of undercut. (6)

[15]

QUESTION 10: CALCULATION AND PLANNING

10.1 Determine the mass of the following sections from the given weight in TABLE 1 below:

10.1.1 150 × 16 × 4 000 mm long (2)

10.1.2 400 × 450 × 25 mm thick (3)

THICKNESS	Mass in kg/m for widths in mm										
mm	100	110	130	150	180	200	250	300	350	400	450
6	4.71	5.18									
8	6.28	6.91	8.16	9.42							
10	7.85	8.69	10.24	11.8	14.7	15.7					
12	9.42	10.4	12.2	14.2	17.0	18.8					
14	11.0	12.1	14.3	16.5	19.8	22.0					
16	12.6	13.8	16.3	18.8	22.6	25.1	31.4	37.7			
18	14.1	15.4	18.4	21.2	25.4	28.3	35.3	42.4	49.4	56.5	63.5
20	15.7	17.3	20.4	23.6	28.3	31.4	39.2	47.1	54.9	62.8	70.6
25	19.6	21.6	25.5	29.4	35.3	39.2	49.1	58.9	68.6	78.5	88.2
30	23.6	25.9	30.6	35.3	42.4	47.1	58.9	70.6	82.4	94.2	106.0
35	27.5	30.2	35.7	41.2	49.5	55.0	68.7	82.4	96.1	110.0	124.0

TABLE 1

10.2 The following data regarding a close tank is available:

Inside diameter = 1800 mm
Inside height = 1100 mm
Thickness of plate = 12 mm

Calculate the mass of the plate to manufacture the tank if 1 mm thickness plate = 7.85 kg/m² (10)

NOTE: Circumference of a cylinder = 3,142 × mean diameter of cylinder.
Area of a circle = 3,142 × r²

[15]

TOTAL: 100