DEPARTMENT OF HIGHER EDUCATION AND TRAINING
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE: MULTI-DISCIPLINARY DRAWING OFFICE PRACTICE

MECHANICAL AND DRAWING-OFFICE ORIENTATION

TIME: 3 HOURS

MARKS: 100

NOVEMBER 2012

INSTRUCTIONS AND INFORMATION

1. Answer ALL the questions.
2. Read ALL the questions carefully.
3. Number the answers correctly according to the numbering system used in this question paper.
4. ALL the drawings must be of reasonable size, in good proportion and made in pencil.
5. Full marks = 100%
6. Write neatly and legibly.

QUESTION 1: INDUCTION

1.1 State the FOUR levels of graphic communication in their correct order. (4)

1.2 Make a neat, sectional drawing of a transition fit of a shaft into a hole. Indicate the following on the drawing: (3)

1.2.1 Minimum interference (1)

1.2.2 Maximum clearance (1)

1.2.3 Minimum clearance (1)

1.2.4 Shaft and hole (2)

[12]

QUESTION 2: DRAWING-OFFICE LAYOUT AND EQUIPMENT

2.1 Indicate whether the following statements are TRUE or FALSE. Choose the answer and write only 'true' or 'false' next to the question number (2.1.1 – 2.1.6) in the ANSWER BOOK.

2.1.1 Drawings should not be filed consecutively. (1)

2.1.2 Use bright light in a CAD drawing room. (1)

2.1.3 A draftsman should have good problem-solving abilities. (1)

2.1.4 Copy machines operate at a lower cost than duplicating machines. (1)

2.1.5 Catalogue is an important document for a drawing office. (1)

2.1.6 Air-conditioning can be used for ventilation. (1)

2.2 State any FOUR aspects regarding lighting that need to be considered before planning the layout of a drawing office. (4)

[10]

QUESTION 3: ENGINEERING MATERIALS AND HEAT TREATMENT

3.1 State THREE characteristics of each the following materials:

3.1.1 Copper (3)

3.1.2 Aluminium (3)

3.1.3 Lead (3)

3.2 Briefly explain, in your own words, the meaning of a non-ferrous metal. (1)

3.3 State the purpose of the tempering process. (3)

3.4 Name the TWO groups of plastic. (2)

[15]

QUESTION 4: MACHINING

4.1 Indicate whether the following statements are TRUE or FALSE. Choose the answer and write only 'true' or 'false' next to the question number (4.1.1 – 4.1.5) in the ANSWER BOOK.

4.1.1 Limits is the two extreme permissible sizes of a part between which the actual size should lie. (1)

4.1.2 Countersinking is the conical enlargement of the mouth of a hole. (1)

4.1.3 Slotting is done with a tap. (1)

4.1.4 Chamfering can be done on any machine. (1)

4.1.5 The tool of a shaper is fitted in a ram that moves forward and backward. (1)

4.2 Briefly explain the forging process. (2)

4.3 State TWO primary functions of a lathe. (2)

4.4 Explain the term *tolerance.* (1)

[10]

QUESTION 5: MEASURING INSTRUMENTS

5.1 Name FOUR main components of a vernier caliper. (4)

5.2 Name SIX main components of a micrometer. (6)

[10]

QUESTION 6: KEYS, PULLEYS, CLUTCHES, COUPLINGS AND SCREW THREADS

6.1 Briefly explain the operation of a centrifugal clutch. (4)

6.2 Name THREE permanent couplings. (3)

6.3 Name any TWO types of shaft keys. (2)
[9]

QUESTION 7: BEARINGS AND LUBRICATION

7.1 Make use of a neat sectional drawing to show the correct way to feed oil to thrust bearings. No labelling is required. (5)

7.2 Give THREE reasons for noise and vibration on a bearing. (3)

7.3 Briefly explain, in your own words, what you understand by a full-pressure lubricating system. (2)
[10]

QUESTION 8: GEAR DRIVES

8.1 If the module (m) of a gear system is equal to 8, calculate the dedendum of the gear system. (2)

8.2 Explain, in your own words, each of the following in relation to spur gears:

8.2.1	Addendum	(1)
8.2.2	Dedendum	(1)
8.2.3	Circular thickness	(1)
8.2.4	Chordal thickness	(1)
8.2.5	Backlash	(1)

8.3 Name the gear system that converts rotary motion into straight-line motion. (1)

8.4 Calculate the number of teeth of a gear with a pitch-circle diameter (PCD) of 80 mm and a module of 8. (2)
[10]

QUESTION 9: VALVES, PUMPS AND PIPE FITTINGS

9.1 Make use of a neat drawing and indicate on the drawing where you will find the following in a piston pumping system:

9.1.1	Strainer	(1)
9.1.2	Foot valve	(1)
9.1.3	Delivery valve	(1)
9.1.4	Non-return valve	(1)
9.1.5	Suction head (hs)	(1)
9.1.6	Delivery head (hd)	(1)
9.1.7	Static pressure head (Hs)	(1)
9.1.8	Friction head (Hf)	(1)

9.2 Give a function of each of the following valves:

9.2.1	Rotary valve	(1)
9.2.2	Relief valve	(1)

9.3 Name any FOUR components of a centrifugal pump. (4)

[14]

TOTAL: 100