

ELC – Technical and Electrical Drawing

T092

Friday, 01/11/2013

8:30 – 11:30 AM

WORKFORCE DEVELOPMENT AUTHORITY



P.O.BOX 2707 Kigali, Rwanda Tel: (+250) 255113365

**ADVANCED LEVEL NATIONAL EXAMINATIONS, 2013;
TECHNICAL AND PROFESSIONAL TRADES**

EXAM TITLE: Technical and Electrical Drawing

OPTION: Electricity (ELC)

DURATION: 3hours

INSTRUCTIONS:

The paper contains **Three (3)** Sections:

Section **I:** Eighteen **(18)** questions, all **Compulsory**. **55marks**

Section **II:** Five **(5)** questions, **Choose any Three (3)**. **30marks**

Section **III:** Three **(3)** questions, **Choose any one (1)**. **15marks**

Use of a ruler is allowed

Section A: Attempt all the 18 questions.

55marks

01. After margining your paper A₄ size and completing the title block, draw the symbols for the following: **3marks**

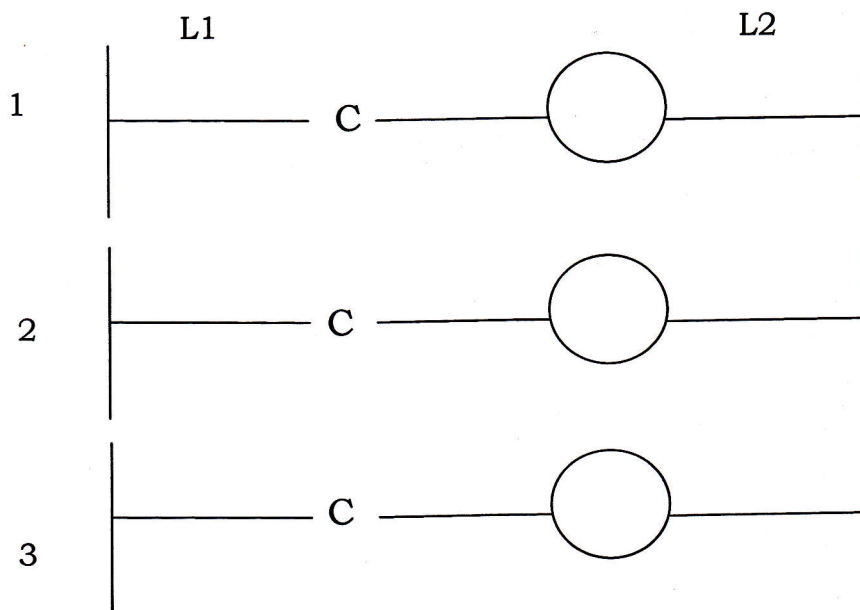
- a) Thermal overload relay;
- b) Magnetic overload relay;
- c) Power fuse;
- d) Heating element;

02. Using a ruler complete the following diagrams with the appropriate symbols as called for in each of the circuit descriptions given below:

Circuit 1: A start station **1mark**

Circuit 2: A start/stop station **1mark**

Circuit 3: A start/stop station with an emergency push button **1mark**

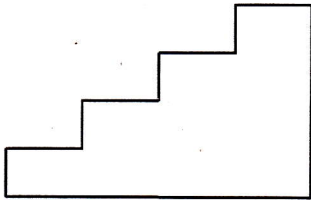


03. Complete the line diagram so that any of the three start pushbutton will start the motor and any of the three stop pushbutton will stop the motor. This circuit must also include MEMORY so that the motor will remain running after any start pushbutton is pressed and released. **3marks**

04. Redraw the circuit of question (03) adding 2 pilot light, the red pilot light is to be on any time the motor is on, and the green light is to be on any time the motor is off. **3marks**

05. Redraw the circuit of question 4 adding a selector switch that can be used to place the circuit in a 'jog' or 'run' position. **3marks**

06. Illustrate how two pushbuttons can be connected to form AND logic. The pushbuttons are to control a solenoid. **3marks**
07. Develop an OR logic according to the conditions stated: **3marks**
- i. Signal = one mechanical (limit switch) and one manual (pushbutton)
 - ii. Decision = OR logic
 - iii. Action = bell ringing
08. Draw a line diagram of how a circuit may be designed to produce NOT logic. **3marks**
09. Illustrate a three pole magnetic motor starter. **3marks**
10. Draw a circuit comprising a contactor and show where fuses should be placed. **3marks**
11. Divide a line of 120mm into seven equal parts. **2marks**
12. Draw an angle of 75° using a pair of compass and ruler only. **3marks**
13. Dimension the given drawing using parallel method of dimensioning. **2marks**

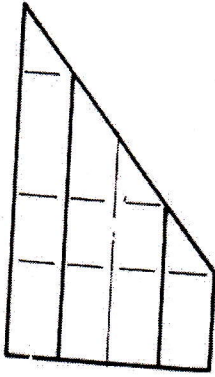


14. Draw a circle and indicate the following parts: **3marks**
- (a) arc; (b) chord; (c) sector
 - (d) Segment; (e) circumference; (f) Diameter.
15. Construct an ellipse by concentric circle method, give major axis as 80mm and minor axis as 50mm. **3marks**
16. (a) What is a quadrilateral? **1mark**
- (b) Draw four types of quadrilateral figures. **5marks**
17. Name four features found in the titles block. **2marks**
18. Draw a regular hexagon given the length of one side equal to 30mm. **4marks**

Section II: Choose and answer any three (3) questions. 30marks

19. Draw the wiring diagram of a FORWARD-REVERSE-STOP pushbutton station. Overload protection is common to both forward and reverse. Your connecting lines should be straight and the circuit neatly drawn. Do not make any wire splices or additional terminal connections on the wiring diagram. All connections must run from terminal screw to terminal screw. **10marks**
20. Draw the power circuit used to start a Dahlander motor forward and reverse. **10marks**
21. Draw the control and the power circuit used for counter current braking. **10marks**
22. Draw a wiring diagram of an ON delay synchronous motor timer controlling several loads when actuated by a limit switch. **10marks**

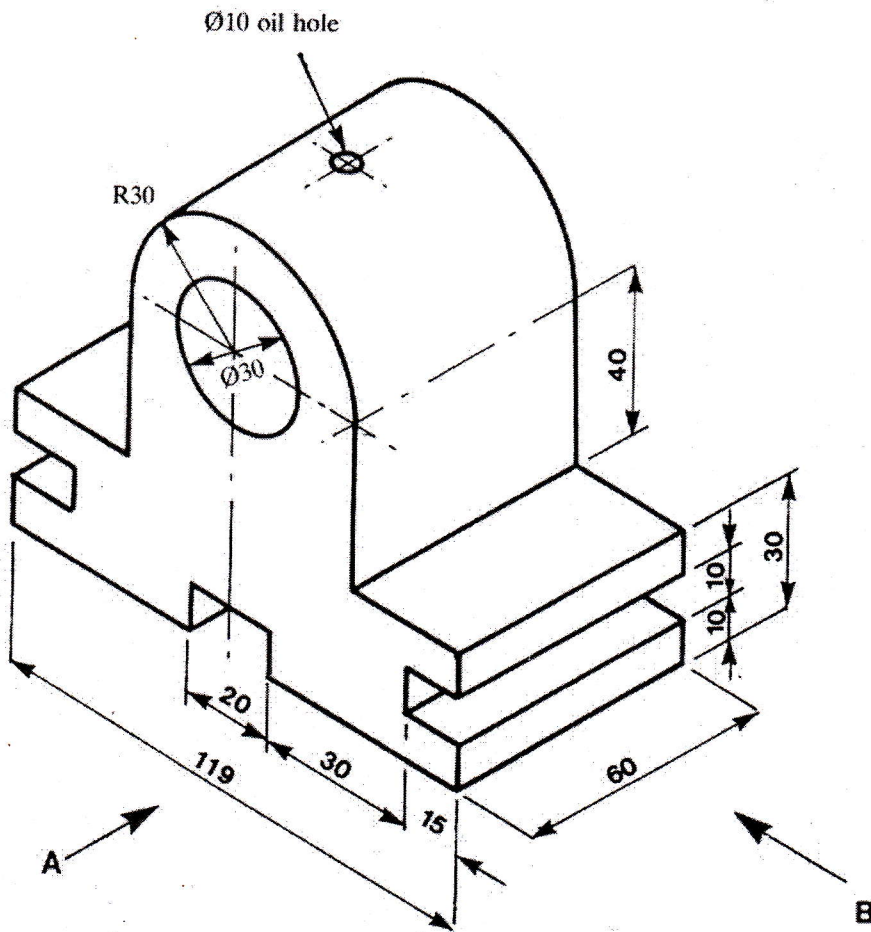
23. Find the true shape and development of truncated cylinder below.



Section III. Choose and answer any one (1) question. 15marks

24. Draw the views of the given block in first angle projection.

- (a) An elevation in the direction of arrow **A**.
- (b) A plan view.
- (c) Side view as indicated by arrow **B**
- (d) Indicate also the projection symbol.



15marks

25. Draw the power circuit of a wound rotor motor started in three steps.

15marks

26. Draw the power circuit of a two speed, two separate windings three phase induction motor.

15marks