

ELC – Electrical Drawing

T038

Friday, 31/10/2014

8:30 - 11:30 AM

WORKFORCE DEVELOPMENT AUTHORITY



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**ADVANCED LEVEL NATIONAL EXAMINATIONS, 2014
TECHNICAL AND PROFESSIONAL TRADES**

EXAM TITLE: Electrical Drawing

OPTION: Electricity (ELC)

DURATION: 3hours

INSTRUCTIONS:

The paper is composed of **three (3) main Sections:**

Section **I:** Fifteen **(15)** questions, all **Compulsory.**

55marks

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

30marks

Section **III:** Three **(3)** questions, **Choose any One (1).**

15marks

SECTION I. FIFTEEN (15) COMPULSORY QUESTIONS.

01. Draw three field windings of Delta and Star connection and indicate the markings of the connection with the links. **2marks**
02. Draw the symbols of the following items:
a) diode b) photo voltaic cell c) photo conductive cell
d) photo conductive diode e) LED. **5marks**
03. Draw the representation circuit diagram for:
a) Right-hand rotation DC shunt wound generator
b) Left hand rotation DC series wound motor. **4marks**
04. Draw a line diagram of a manual switch with over load protection controlling a motor. **4marks**
05. Draw the two-way switch, schematic diagram single pole to control two lamps. **2marks**
06. Use the starting capacitor to draw the circuit diagram and control circuit for:
a) Delta connection of single phase-connected three phase AC motors.
(Right-hand: clockwise)
b) Star connection of single phase-connected three phase AC motors.
(Left-hand: anticlockwise) **5marks**
07. Draw the symbol of a contactor having 3 main contacts, 2N.O contacts and 2 N.C contacts. **3marks**
08. Draw the symbols of the following items:
(a) a bell (b) a fuse (c) fixed capacitor
(d) adjustable capacitor (e) tunnel diode. **5marks**
09. A 12V/15W inspection-lamp for a boiler installation is operated via a fixed 220V/12W transformer in a metal enclosure. The primary side phase is protected by a fine fuse. The inspection lamp is connected to an extra-low-voltage socket on the transformer enclosure via a flexible two-core-cable and plug.
Draw the single line diagram. **5marks**
10. Draw a line diagram of a circuit designed with a start/stop station and a pilot to indicate when a device is not activated. **5marks**
11. Draw a line diagram of a circuit designed with start/stop station and a pilot light to indicate when a device is activated. **3marks**
12. A motor is to be started and stopped by one pushbutton. Draw a line diagram of the circuit designed for that. **4marks**
13. Draw a circuit diagram of a lamp operated from one station. **3marks**
14. Illustrate a three pole magnetic motor starter. **3marks**
15. Indicate the equipment coding for protective devices in contactor circuits. **2marks**

SECTION II. ATTEMPT ANY THREE (3) QUESTIONS.

16. Draw the power circuit used to start a Dahlander motor forward and reverse. **10marks**
17. Draw a line diagram illustrating a circuit for starting and stopping a motor in forward and reverse with limit switch providing over- travel protection. **10marks**
18. Draw a wiring diagram of an ON delay synchronous motor timer controlling several loads when actuated by a limit switch. **10marks**
19. A motor is to be started and stopped in forward and reverse automatically with limit switch, draw a line diagram illustrating this circuit. **10marks**
20. Draw a line diagram illustrating a circuit which provides for starting, stopping and jogging in forward and reverse with jogging controlled through a selector switch. **10marks**

SECTION III. ATTEMPT ANY ONE (1) QUESTION.

21. Draw the power circuit of a wound rotor motor started in three steps. **15marks**
22. Draw the power circuit of a two speed, two separate windings three phase induction motor. **15marks**
23. Complete the line diagram according to the circuit information given below. Use standard lettering, numbering and coding information. Connecting lines should be straight and the circuit neatly drawn.

Circuit 1: Three magnetic motor starters are to be controlled by a common start- stop pushbutton station. Interconnect the three starters so that if an overload occurs on any of the starters, all three starters will automatically be disconnected.

Circuit 2: Three magnetic motor starters are to be controlled by three individual start-stop pushbutton station. Add to this circuit a master stop that will stop all three starters when pressed. When the master stop is not used the starters can be individually stopped by each start-stop station. Each starter must have its own overload protection.

Circuit 3: Redraw circuit 2 adding a pressure switch that will automatically stop all motors if a too high pressure is reached. **15marks**