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**

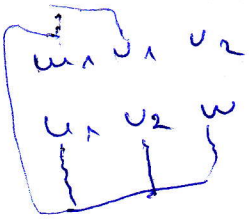
SECTION I. FIFTEEN (15) COMPULSORY QUESTIONS.

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**