ELC – Electrical Drawing

T039

Friday, 13/11/2015

08:30 – 11:30

WORKFORCE DEVELOPMENT AUTHORITY

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ADVANCED LEVEL NATIONAL EXAMINATIONS, 2015, TECHNICAL AND PROFESSIONAL TRADES

EXAM TITLE: **Electrical Drawing**

OPTION: **Electricity (ELC)**

DURATION: **3hours**

INSTRUCTIONS:

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

Section **I**: Sixteen **(16)** questions, all **Compulsory**. **55marks**

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

Section **III**: Three (3) questions, **Choose only One (1).** **15marks**

Every candidate is required to strictly obey the above instructions. Punishment measures will be applied to anyone who ignores these instructions.

Section I. Sixteen (16) Compulsory questions. 55marks

01. Draw the symbols for the following:

a) Earth ground;

b) AC Generator;

c) Relay with transfer contacts;

d) Single-Pole-Double Throw (SPDT)

e) Circuit breaker 3 poles with only magnetic trip unit

f) Fuse **6marks**

02. Give four (4) examples of natural insulating materials. **2marks**

03. What do you understand by line diagram and what is it used for? What is the main advantage of line diagram? **3marks**

04. What is wiring diagram and what does it used for? **3marks**

05. Draw a wiring diagram for a home installation system using two lamps with switch control and three pin socket with switch control. **5marks**

06. Draw a house connection diagram (with your hand drawing) for a two lamps in series connection controlled by one switch. **4marks**

07. Differentiate Manual control circuit to automatic control circuit. **2marks**

08. Differentiate a contactor from a magnetic motor starter. **2marks**

09. Draw a line diagram of a circuit designed with two pushbuttons and a pilot in which both pushbuttons must be pressed at the same time to allow current to flow from L1 through the load to L2. **3marks**

10. Draw a line diagram with line numbering where line 1 connects pushbutton 1 to pilot light 1, line 2 connects pushbutton 2 to pilot light 1, and line 3 connects switch 1 to pilot light 2 and to the "M" contactor on line 4. **4marks**

11. Draw a ladder diagram for AC power control systems, where the "hot" and "neutral" power conductors are drawn as vertical lines near the edges of the page, with three loads (light, Solenoid and Heater) and switch contacts drawn between those lines like rungs on a ladder. **4marks**

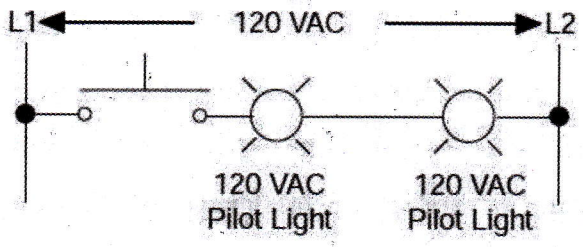
12. Draw the line diagram with a common switch to three loads (Control relay coils, solenoids, and pilot lights) that use the electrical power from L1 to L2 and are connected directly or indirectly to L2. **4marks**

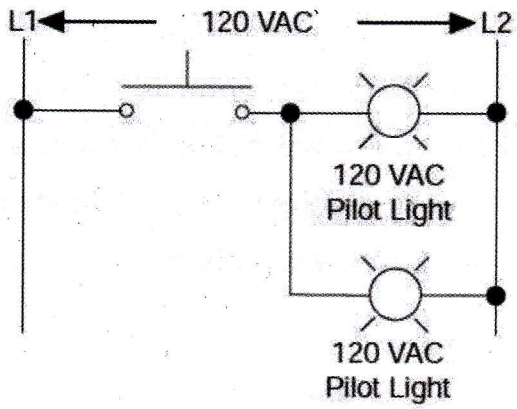
13. Develop an AND logic using two pushbutton switches to control one solenoid. **2marks**

14. Draw an OR logic with a pushbutton and a temperature switch in signal section. Use a resistive heating element as a load in action section. **3marks**

15. Draw a line diagram showing how a circuit may be designed to produce NOR logic. **4marks**

16. Which one is properly connected among the following line connection diagrams? Explain why? **4marks**





Section II. Answer any three (3) questions of your choice

(Do not choose more than <u>three questions</u>). 30marks

17. Draw the assembled representation including the terminal board of connection of self-excited DC shunt generator connecting to an existing 220V two wire network via fuses, two poles manual operated multi position maintained switch and a field rheostat. **10marks**

18. Draw the power circuit used to start a Dahlander motor forward and reverse. **10marks**

19. Draw a manual control circuit for star delta stating of three phase induction motor by using cam switch. **10marks**

20. Draw a power circuit for star delta starting with stator resistor of three phase induction motor. **10marks**

21. Draw a power circuit for autotransformer starter of three phase induction motor. **10marks**

Section III. Answer any one (1) question of your choice

(Do not choose more than one question). 15marks

22. A Dahlander motor is to be operated in lower and higher speed. Draw the power circuit and the control one. **15marks**

23. A three phase asynchronous motor with two separate and isolated windings is to be operated to a pole changing contactor for operation at low and high speeds. Draw the power and the control circuits. **15marks**

24. A three phase motor is to be operated in automatic star-delta reversing circuit. The motor should start up in star and, after, a set time delay should switch over to a delta circuit. This start up should be applied to both clockwise and anti-clockwise rotation. **15marks**