

ELC – Electrical Drawing

T002

Friday, 24/11/2017

08:30 – 11:30 AM

WORKFORCE DEVELOPMENT AUTHORITY



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**ADVANCED LEVEL NATIONAL EXAMINATIONS, 2017,
TECHNICAL AND PROFESSIONAL STUDIES**

EXAM TITLE: ELECTRICAL DRAWING

OPTION: Electricity (ELC)

DURATION: 3 hours

INSTRUCTIONS:

The paper is composed of **the following sections:**

Section I: Thirteen (13) compulsory questions. 55 marks

Section II: Attempt any three (3) out of five questions. 30 marks

Section III: Attempt any one (1) out of two questions. 15 marks

Note:

Every candidate is required to carefully comply with the above instructions. Penalty measures will be applied on their strict consideration

Section I. Thirteen (13) compulsory questions**55 marks**

- 01.** What is electrical circuit diagram? **3 marks**
- 02.** Draw a circuit presenting a two short shunt compound DC generator connected in parallel. **4 marks**
- 03.** Draw a wiring diagram for two bells each controlled independently with push button. **3 marks**
- 04.** Draw power and control diagram for starting asynchronous motor in forward and reverse. **6 marks**
- 05.** Draw a circuit diagram to control four lamps in parallel in four different positions. **4 marks**
- 06.** Draw a circuit diagram to control the lighting installation for stairways in four switching position using two-way and one-way switches only. **5 marks**
- 07.** Complete the following table related to electrical drawing symbols:

No	designation	Symbol
1	Motor driven timing relay	
2	Contactor with delayed pull in and drop out	
3	Three phase asynchronous motor with slip ring rotor	
4	Door opener	
5	Normally closed contact of thermal relay	
6	Star - Delta Stator	
7	Com switch	
8	Normally closed contact with temperature dependent operation mechanism	
9	Three phase transformer star / zigzag connection	
10	Current transformer two secondary winging	

5 marks

- 08.** Draw a forward and reverse control circuit of DC shunt motor. **4 marks**
- 09.** Draw a power circuit to control a three phase induction motor supplied by single phase power supply. **3 marks**

10. Draw a power circuit of stator resistor starter of three phase induction motor. **4 marks**
11. Draw a schematic diagram for starting three phase induction motor when the motor and contactor are supplied by different supply voltage. **4 marks**
12. Draw electrical circuit diagram to represent three phase induction motor breaking by injection of DC current. **4 marks**
13. Draw a warring diagram of two switching position of three phase induction motor starter. **6 marks**

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

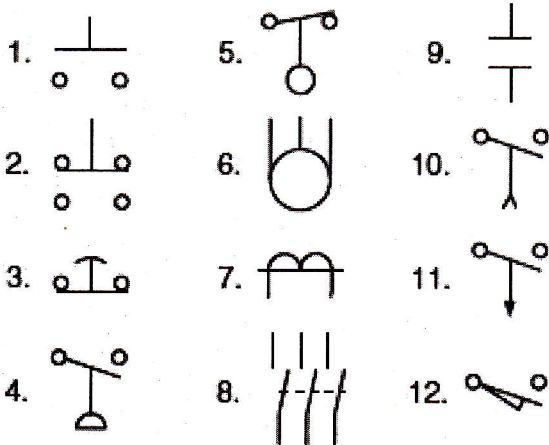
14. Draw a line diagram of a contactor (magnetic motor starter) from three stations. **10 marks**
15. Draw a line diagram of two contactors A and B operated each from its own station so that B can not be energized if A is not. **10 marks**
16. Two contactors A and B are to be operated in such a way that B can not be excited while A is excited and vice-versa. **10 marks**
17. Three magnetic motors starters are to be controlled by one start-stop station. Using a line diagram, interconnect them so that if an overload occurs in any one of the three starters, all the three will be automatically disconnected. **10 marks**
18. A motor is to be operated from three stations. Complete the line diagram so that any of the three start pushbuttons will start the motor and any of the three stop buttons will stop the motor. **10 marks**

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

19. A) Draw motor control circuit working in forward and reverse such that the motor will run either forward or backward once the corresponding pushbutton switch is pressed, and will continue to run as long as there is power. Explain the working principle of your control circuit.

B) Redraw the same motor control circuit and show how to stop either circuit (forward or backward).

20. A) Identify the following symbols:



B) Draw the Schematic diagram of a four-point primary resistor starter.

21. Draw the symbols of the following terms used electrical drawing:

- a) breaker with trigger thermal
- b) breaker with trigger magnetic
- c) breaker Differential
- d) switch operated by cam
- e) switch operated by fluid level
- f) Switch operated by centrifugal force
- g) Switch operated by centrifugal force
- h) Synchronoscope
- i) Horn or Siren
- j) Voltage indicator capacitive.