Electrical Drawing and Technology
F3-6034

CAMEROON GENERAL CERTIFICATE OF EDUCATION BOARD

Probatoire Technique Examination

JUNE 2016 **Date: Friday 27-05-2016**

Series/ Specialties	**Electrical Technology (F3)**
Subject Title	**Electrical Drawing and Technology**
Subject Code No.	**F3-6034**
Type of Exam	**WRITTEN**
Weighting (Coef.)	**SEE INSIDE**

Duration: 8:00 - 11:00

General Instructions

You are reminded of the necessity for good English and orderly presentation of your material. Where calculations are involved show your working, giving your answer at each stage.

Content: QUESTIONS

Specific Instructions

Turn over

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Peace – Work – Fatherland

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PROBATOIRE DE TECHNICIEN
Session: 20.....
Series F3 – Electrotechnology
Duration: 03H
Coefficient: 03
Written Paper

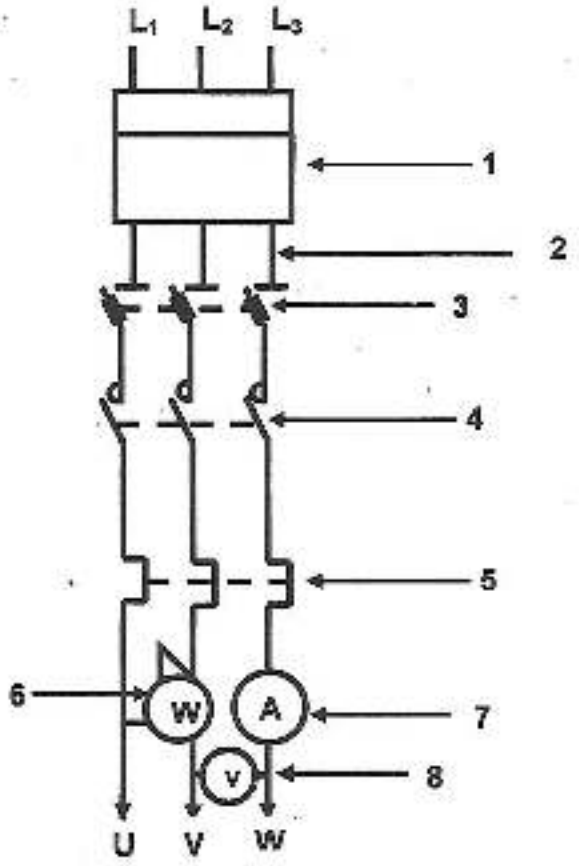
ELECTRICAL DRAWING AND TECHNOLOGY

No document is authorized except those given to the candidates by the examiners.
The paper has 2 parts.
Number of pages : 5,from 1/5 to 5/5.

PART I : TECHNOLOGY — 10mks

Exercise 1: Electrical Appliances — 6mks

Consider here below, the diagram of the power circuit supplying a three-phase induction motor.



1-In a table form, identifies, classify and give the function of each of the appliances with the locating marks from 1to 8. — 0,5mkx8

Locating mark	Appliance name	Type of appliance	Function in the circuit
1			
2			
3			
4			
5			
6			
7			
8			

2-State the working principle of the element 5 **0.5mk**
3-Name 4 parts of the element 4 **1mk**
4-Name an appliance which can play the same role as the element 3 **0.5mk**
4mks

Exercise 2: Lighting

A store has the following characteristic
-Dimensions: length 40m ; width 20m ; useful height 8m.
- Reflection factor of the walls :ceiling 70% ; walls 10% ; floor 10%.
-Fittings: Ballon- shaped fluorescent lamp, chromatic bright of 5400Lm directly on ceiling.
- Direct intensive lighting, using class C fittings of 0.9 efficiency. The distance between fittings is 5m.
- Depreciation factor: d=1, 3.

With the use of the annex document of page 4/5:

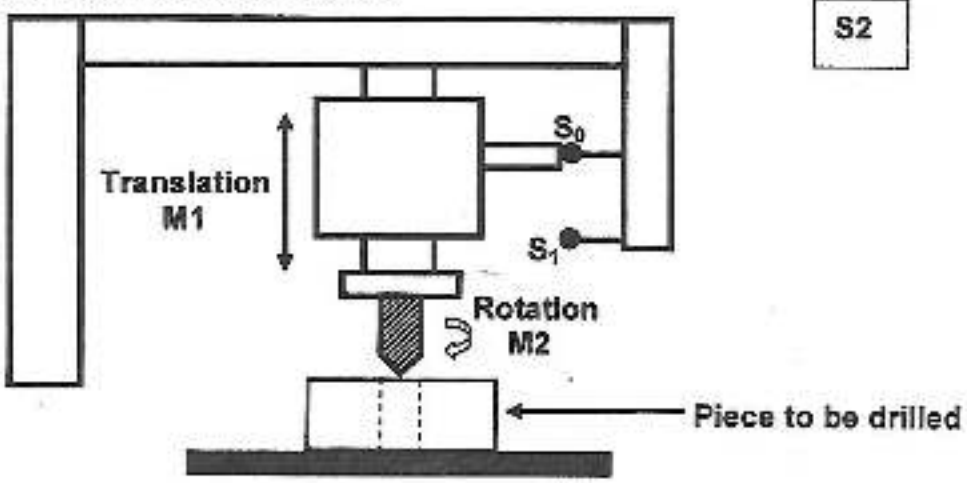
1- Determine the number of fittings:
a- In the length direction. **0.5mk**
b- In the width direction. **0.5mk**
c-. In the whole store. **0.5mk**
2-Calculate the total flux luminous necessary for the lighting of the store. **0.5mk**
3-Determine the locale index k and the utilance U. **1.5mk**
4-Determine the value of the required illumination for this store. **0.5mk**

II-PART II: Diagram

THEME: Automatic drilling machine **10mks**

1-Description

An automatic drilling machine comprises : two three-phase, squirrel cage induction motors.
- M1 :220V /380V direct on line starting for translation movements. (ascending, and descending).
- M2 : 380V/660V direct on line starting, for the rotation of the drill.
- Two limit switches S_0 (drill at the upper position) and S_1 (drill at the lower position).
- A push button S_2 to start the machine.



The above figure illustrates the drilling machine.
The drilling machine equipment is supplied with a 220V/380V-50Hz source.

2-Functioning:
The isolator Q being closed and the initial conditions (drill at rest and at the upper position) being fulfilled :
-A pulse on S_2 provokes simultaneously the rotation and the descending of the drill.
-when the piece is drilled (S_1 actuated), the drill automatically ascends. Upon arrival at the Upper position (S_0 actuated), it stops:It is end of the drilling process; a new drilling operation Can only begin if there is a new pulse on S_2.

3- Nomenclature of the material
Q : Main fused isolator.
F1 : Thermal relay for the protection of motor M1.
F2 : Thermal relay for the protection of motor M2.
KM1 :Descending contactor of the drill.
KM2 : Ascending contactor of the drill.
KM3 : Rotation contactor of the drill.

4- Work to be done

1-Indicate how each motor should be coupled and justify your choice.	**2mks**
2-Illustrate on the terminals plate the coupling of M1 and M2.	**1mk**
3- Establish the diagrams of the power circuits of motors M1 and M2	**4mks**
4- Complete the level 2 functional flow chart FFC given on the page 5/5	**3mks**

TABLE OF UTILANCES

F1: Class *C* luminaire; Suspension ratio *J = 0*

Reflectance		873	871	773	771	753	751	731	711	551	531	511	331	311
Room index	0.6	72	66	70	65	59	56	50	46	55	49	45	49	45
	0.8	83	76	81	74	70	66	60	55	65	59	55	59	55
	1.00	91	81	88	80	77	72	67	62	71	66	62	65	62
	1.25	98	87	95	85	85	79	73	69	77	72	69	72	68
	1.50	102	90	99	88	90	82	77	73	81	76	73	75	72
	2.00	108	94	105	93	97	88	84	80	86	82	79	81	78
	2.50	112	97	109	96	102	91	87	84	89	86	83	85	82
	3.00	115	99	111	97	105	94	90	87	91	89	86	87	85
	4.00	119	101	115	100	109	96	94	91	94	92	90	90	89
	5.00	121	102	117	101	112	98	96	94	96	94	92	92	91

F2: Class *H* luminaire; Suspension ratio *J = 0*

Reflectance		873	871	773	771	753	751	731	711	551	531	511	331	311
Room index	0.6	57	52	55	51	40	38	39	25	37	30	24	29	24
	0.8	66	60	64	59	49	46	36	32	45	37	31	36	31
	1.00	77	69	74	67	60	56	47	41	54	46	41	46	41
	1.25	83	74	90	72	66	61	53	46	59	52	46	51	46
	1.50	89	78	85	76	72	66	58	52	64	57	52	56	51
	2.00	85	84	93	83	81	73	66	60	71	65	59	63	58
	2.50	101	87	97	86	87	78	71	66	75	70	65	68	64
	3.00	105	90	101	88	91	81	75	70	79	74	69	72	68
	4.00	111	94	106	92	98	86	81	76	84	79	75	78	74
	5.00	114	96	109	94	102	89	85	81	87	83	79	81	78

Level 2 : Functional Flow Chart