GOVERNMENT OF MALTA
MINISTRY FOR EDUCATION, SPORT, YOUTH
RESEARCH AND INNOVATION
DEPARTMENT OF EXAMINATIONS

EXAMINATION FOR AUTHORISATION A

Paper 1

Date: **Monday 26th January 2026**

Time: **15.30 – 18:00 (Two hours thirty minutes)**

This examination paper includes ten questions. Candidates are requested to answer ALL questions clearly indicating the question number of the answered questions.

Write only your Index Number in the space provided in the booklet.

Candidates are requested to answer ALL questions in the booklet correctly listing the answered question number in the space provided on the booklet's front sheet.

Answers should be written in Blue/Black ink. Diagrams can be drawn in pencil.

All answers should include the necessary workings, diagrams and formulae.

Use a separate page for each different question.

Each question carries 10 marks.

1. (a) Explain **THREE** main hazards, that an Authorised person may be exposed to, in an environment where execution of electricity work is being carried out. (6 marks)

(b) Identify **TWO** potential injuries that can result from faulty electrical equipment or improper handling of electrical equipment. (4 marks)

2. (a) It is mandatory for Authorised persons to wear personal protective equipment (PPE). Authorised persons have PPE designed specifically for their job. List and briefly explain any **THREE** PPE commonly used by Authorised persons. (6 marks)

(b) In 2006 the single-phase electrical installation UK wiring colour code has changed. Give the previous and current (new) UK wiring colours. (4 marks)

3. (a) Explain what is meant by positive temperature coefficient (PTC) and give **ONE** example. (2 marks)

(b) The resistance of a copper wire at 0 ^{o}C is 100 Ω. Calculate the resistance of the coil at 30 ^{o}C.

The temperature coefficient of copper is 0.004 Ω/Ω deg C. (3 marks)

(c) The field coils of a motor have a resistance of 200 Ω at 20 ^{o}C. Find the resistance of the coils when the motor temperature increases to 40 ^{o}C. The temperature coefficient of the conductor is 0.004 Ω/Ω deg C. (5 marks)

4. (a) Three capacitors of 120, 80 and 48 μ F respectively are connected in series across a 500 V d.c. supply.

Calculate the following:

(i) total capacitance (4 marks)

(ii) the charge on each capacitor. (3 marks)

(b) Three capacitors of 60, 40 and 24 μF respectively are connected in parallel across a 500 V supply. Calculate the total capacitance. (3 marks)

5. The following table shows the symbols and definitions used in BS7671. On the provided answer booklet, copy and complete the missing symbols or definitions.

   The first one is completed as an example.

	Symbol	*Definition*
Example	I_t	*Value current capacity Ambient temperature for single circuit,*
1	I_b	
2		Rated current of protection device.
3	I_2	
4		Ambient temperature
5	C_c	
6		Depth buried cable
7	C_g	
8		Semi-enclosed fuse BS3036
9	C_i	
10		Thermal resistivity of soil.

(10 marks)

6. (a) Define the term protective conductor. (2 marks)

   (b) List **THREE** types of earth electrodes that are used for a TT system. (3 marks)

   (c) What is the recommended cross-sectional area for a buried earthing conductor that is not protected against corrosion? (2 marks)

   (d) For an earth electrode, give the

   (i) cross-sectional area,

   (ii) length and

   (iii) accepted resistance value according to Maltese regulations. (3 marks)

7. List and explain **FIVE** factors to be considered when designing an electrical installation in accordance with the BS 7671 and the local Electrical Installation Regulations.

(10 marks)

8. The instruments provided in the box below are provided to an Authorised person who is conducting tests on a single-phase installation.

- a 500 V insulation tester
- multimeter which can measure voltages ac and dc, current ac and dc and low resistance with accuracy of +/- 0.1 Ω
- loop impedance tester

(a) (i) Name the instruments that can be used on live circuits. (State the mode setting where applicable). (2 marks)

(ii) Name the instruments that can be used on dead circuits. (State the mode setting where applicable). (2 marks)

(b) Which of the above instrument(s) can be used to carry out a polarity test? Specify the mode setting prior to use this instrument and state also what other necessary links must be installed at the Main distribution board to carry out this test.

(3 marks)

(c) The Loop impedance tester is used to test the Earth loop impedance Z_e at the Main distribution board point. Specify with the aid of a diagram the impedance components involved in a TT system contributing to this total resistance reading displayed on the instrument.

(3 marks)

9. A 3200 W electronically controlled instantaneous electric water heater will be installed in the shower. The heater is specifically designed and can be installed in Zone 1.

(a) By means of a sketch illustrate Zone1 positions in a typical bathroom equipped with Bathtub and shower. (3 marks)

(b) On the sketch drawn in (a) mark clearly other zones including Zones 0, Zone 2 and Zone 3 specifying the distances that must be respected. (2 marks)

(c) Calculate the full load current of the instantaneous electric water heater. (2 marks)

(d) The following list shows **THREE** actions (X, Y, Z) in electrical installation. Select the action that is NOT compliant with the IET Wiring Regulations and give a reason for your answer.

X	Tap off from a fixed adjacent ring connected Socket outlet.
Y	Wire up a final circuit from distribution board to the water heater protected by a single pole MCB rated 25 A which is downstream the RCD of 30 mA.
Z	Wire up a final circuit from distribution board protected by an RCBO rated 16A /30mA placed between the main MCB of 40A and RCD.

(3 marks)

10. The following table shows **TEN** popular electrical symbols commonly used in drawings to specify lighting points and other devices.

1	2	3	4	5	6	7	8	9	10
									

Use the table above to assign the corresponding number to the items listed below.

Number	Item description
	Transformer
	Switched Socket outlet
	2 pole MCB equipped with thermal and magnetic trip elements
	Wall mounted lamp point
	Electric Motor
	1 gang lighting switch
	Earth connection
	Ceiling lamp point
	2 way lighting switch
	Intermediate lighting switch;

(10 marks)

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