

8. (a) The IET Wiring Regulations BS:7671, has a dedicated section for special locations. Mention **five** applications where the main risk arises from the use of water. **(5 marks)**
- (b) What is the main risk related to the electrical installation when using a swimming pool? Give a reason for your answer. **(5 marks)**
9. (a) Agricultural activities require the use of electricity. Describe briefly a typical electrical installation used to pump water from boreholes. **(4 marks)**
- (b) Automatic disconnection is required in agriculture electrical installations. State the RCD rating for final circuits supplying socket-outlets and all other circuits. **(6 marks)**
10. (a) State the obligations related to documents of an authorised person towards a customer. **(5 marks)**
- (b) Explain what the bill of quantities is for works on an electrical installation. **(5 marks)**



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

EXAMINATION FOR AUTHORISATION A

Paper 1

Date: 4th July 2023

Time: 9.00 – 11:00 (Two hours)

END OF EXAMINATION PAPER

This examination paper includes ten questions. Candidates are requested to answer all questions showing all their work in the booklet provided. Every answer should include all workings, any necessary diagrams and formulae. Use a fresh page for each different question. Each question carries 10 marks.

1. (a) According to the Laws of Malta state what every property connected to the national electricity grid (single phase installation) shall be equipped with to abide with the IET Regulations. **(4 marks)**
- (b) State the bathroom zones. **(3 marks)**
- (c) What is the minimum Ingress Protection rating (or just IP rating) for an extractor fan in a shower? **(3 marks)**

2. Calculate the current demand of an electric cooker comprising the following resistive loads:

- A hob with 4 rings at 2.25 kW per ring,
- a main oven rated at 2.5 kW and
- a grill/top oven rated 2.5 kW.
- The cooker control unit incorporates a 13-amp socket outlet.

The cooker is supplied from a 230 V, 50 Hz. Assume the following current demand for the above cooking appliance:

- The first 10 A of the rated current plus,
- 30% of the remainder of the rated current plus
- 5 A if control unit incorporates a socket outlet.

Calculate,

- (i) The cooker total wattage capacity and current. **(4 marks)**
- (ii) Apply the diversity factor given above to calculate the current for the above cooking appliance. **(4 marks)**
- (iii) State the MCB that would adequately protect the above circuit. **(2 marks)**

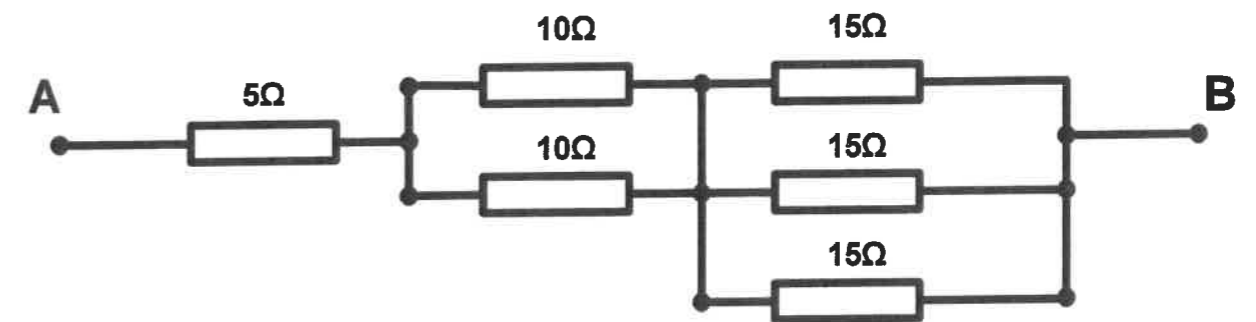
3. Refer to **Conductor size calculations:**

- (a) The size of a cable is critical in any electrical installation. List **four** factors on which the size of a cable depends. **(4 marks)**
- (b) There are a number of factors which have direct impact on the current rating. State and explain at least **three** factors. **(6 marks)**

4. Define the following terms and state their units of measurement.

- i. Magnetic flux, **(3 marks)**
- ii. Magnetic flux density, **(3 marks)**
- iii. Magneto motive force. **(4 marks)**

5. For the circuit shown below, find the equivalent resistance between the terminals A and B. Include drawings showing the simplification of the circuit.



(10 marks)

6. (a) What factors need to be considered when selecting a protective device to protect a given circuit? **(5 marks)**
- (b) With the aid of a diagram explain what is meant by the term "**Discrimination**". Explain how good discrimination is achieved in an electrical installation. **(5 marks)**
7. (a) With the aid of a diagram explain the operation of a single-phase Residual Current device (RCD) **(5 marks)**
- (b) Explain what is meant by:
 - i. Prospective short circuit current **(3 marks)**
 - ii. Overload Current **(1 marks)**
 - iii. Maximum load. **(1 marks)**