



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

EXAMINATION FOR THE ISSUE OF A LICENCE TO ACT AS WIREMAN

Authorization A

Sample Paper I

Time: 2 Hours

This examination paper contains ten (10) questions. Candidates are requested to answer ALL questions. They are also requested to include all their work in the booklet provided. All answers should include all workings, any necessary diagrams, and formulae. Use a fresh page for each different question. Each question carries 10 marks.

1. a. Determine the value of current which when flowing in a resistor of $200\ \Omega$ causes a power loss of 1800 Watts. **(5 marks)**
- b. Determine the resistance of a heater which absorbs 2.5 kW from a 230 V supply. **(5 marks)**

2. a. Refer to **Figure 1**:

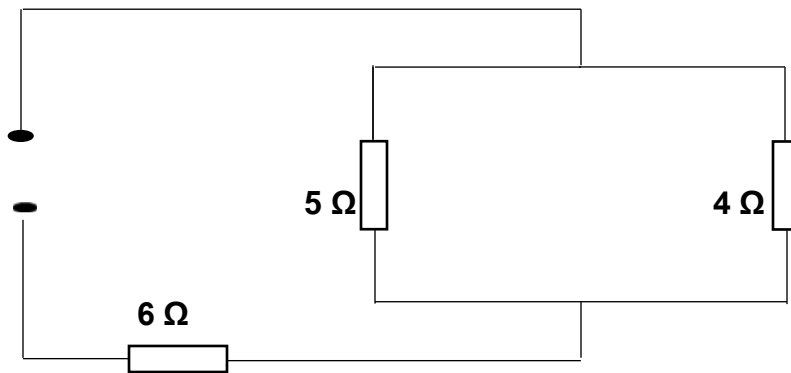


Figure 1

The supply voltage for the above series and parallel circuit shown in Figure 1 above is 100 volts.

State and determine the following:

- (i) State how the resistors $5\ \Omega$, $4\ \Omega$ and $6\ \Omega$ are connected in the above network (Fig. 1). **(2 marks)**
 - (ii) the total resistance **(4 marks)**
 - (iii) the current in each resistor. **(4 marks)**
3. a. Determine the resistance of 100 m of $120\ \text{mm}^2$ single-core mineral-insulated cable. (Resistivity of copper = $1.78 \times 10^{-8}\ \Omega\text{m}$). **(5 marks)**
 - b. Calculate the cross-sectional area of an aluminum cable 50 m long which has a resistance of $0.067\ \Omega$. (Resistivity of aluminum = $2.84 \times 10^{-8}\ \Omega\text{m}$). **(5 marks)**

4. A low-voltage radial circuit is arranged as shown in figure 2 and is wired throughout with 70 mm² copper cable. If for this size of the cable a voltage drop of 0.69 mV per ampere per meter occurs.

- (i) The current in each section **(3 marks)**
- (ii) The voltage drop in each section **(4 marks)**
- (iii) The supply voltage V_s . **(4 marks)**

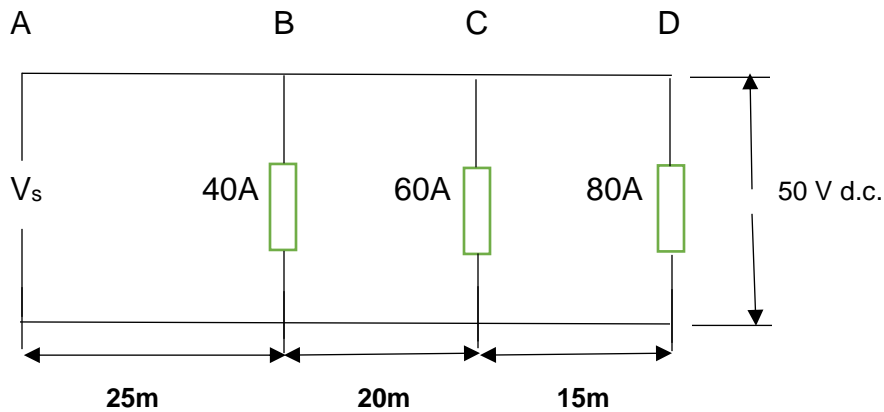


Figure 2

5. In a bath room the following appliances are to be installed:

- Two decorative lighting fittings near the mirror
- A shaver socket outlet
- A hair dryer
- A heater

Explain in detail:

- a. The type of fittings to be installed in the bathroom **(3 marks)**
- b. The method of switching that will be utilised to operate the equipment in the bathroom **(2 marks)**
- c. The location of the installed equipment relative to the zones specified in the IET regulation **(2 marks)**
- d. How the appliances would be earthed in order that the installation would be rendered safe. **(3 marks)**

6. For each of the below earthing system arrangement draw well labelled diagrams showing the system layout and provide a brief explanation for each.
- | | | |
|-------|---------------|------------------|
| (i) | TT system, | (2 marks) |
| (ii) | TN-S system, | (2 marks) |
| (iii) | TN-C-S system | (2 marks) |
| (iv) | TN-C system | (2 marks) |
| (v) | IT system | (2 marks) |
7. a. Why is a residual current device (RCD) required? **(4 marks)**
- b. With the aid of a diagram explain the operation of a single-phase Residual Current device (RCD) **(6 marks)**
8. a. Explain the scope of the Electrical Installation Regulations, S.L.545.24. **(5 marks)**
- b. Explain the responsibilities of a Distribution System Operator. **(5 marks)**
9. a. Explain the scope of the Electrical Supply Regulations, S.L.545.01. **(5 marks)**
- b. Explain how a person can obtain an authorisation to be able to carry out single phase electrical installations. **(5 marks)**
10. a. Explain the requirements of the Electrical Installation Regulations, S.L.545.24, regulation 14, in relation to the tests on completion of an electrical installation. **(5 marks)**
- b. Explain the terms, Technical Specification, Electrical Installation Drawings and Bill of Quantities (BOQ). **(5 marks)**

TOTAL: 100 marks