6. a) What is meant by an inspection fitting and specify the restrictions on the use of solid (non-inspection) elbows and tees? **(4 marks)**

   b) Electricians treat the ends of conduit and end up entries to boxes and accessories by a specific conduit fitting in order to prevent damage to cables. Explain how both the above are achieved when working with conduit in a domestic installation. **(4 marks)**

   c) Comment on the advantages and disadvantages of conduit and trunking systems. What special precautions must be taken when using PVC conduit? **(12 marks)**

Total: 100 marks

END OF EXAMINATION PAPER

GOVERNMENT OF MALTA
MINISTRY FOR EDUCATION AND SPORT
DEPARTMENT OF EXAMINATIONS

EXAMINATION FOR AUTHORISATION A

Paper 2:	**Electrical InstallationTechnology**
Date:	**3 February 2022**
Time:	**16:00 – 19:00 (Three hours)**

This examination paper contains six questions. Candidates are requested to answer any FIVE (5) questions. Candidates are also requested to include 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 20 marks.

1. a) Explain the importance of an earthing system in an electrical installation. **(4 marks)**

   b) With reference to the IEE Regulations, which earthing system has been adopted locally? In your answer mention the other earthing systems used and clearly explain the locally adopted earthing system. **(6 marks)**

   c) With the aid of a clear and well labelled diagram explain how a residual current circuit breaker operates. Your explanation is to include operation under normal, fault and test conditions. Also in the explanation explain what is meant by the term sensitivity in the relation to the operation of this device. **(6 marks)**

   d) What is the purpose of supplementary bonding? **(4 marks)**

2. a) List the tests to be carried out on completion of a new installation. **(5 marks)**

   b) Why a correct test sequence is necessary when testing an installation? **(3 marks)**

   c) With the aid of diagrams describe how you would carry out the following tests on a completed installation. Indicate the instruments used to perform the tests:

   (i)   Ring-Circuit continuity test   **(4 marks)**

   (ii)   Insulation Resistance test   **(4 marks)**

   (iii) Earth Electrode test.   **(4 marks)**

3. a) Draw a clear circuit diagram of a fluorescent lamp. In your diagram show all the component parts of the circuit. **(5 marks)**

   b) Describe using diagrams:

   (i)   the choke   **(3 marks)**
   (ii)   the starter switch   **(3 marks)**
   (iii) the tube   **(3 marks)**
   (iv)   the filaments   **(3 marks)**
   (v)   the main capacitor.   **(3 marks)**

4. a) What is a thermostat and where is it used? **(2 marks)**

   b) Explain how a simple thermostat works. **(5 marks)**

   c) Draw a clear and well-labelled diagram of a type of thermostat used in electric irons. **(10 marks)**

   d) Mention three situations where thermostats are used. **(3 marks)**

5. a) A 240V domestic cooker has the following connected loads:

   - top oven   1.5 kW
   - main oven   2.5 kW
   - grill   2.0 kW
   - four hotplates   2.0 kW each

   The cooker control unit includes a 13A socket outlet.

   Consider the below for a cooking appliance:

   | The first 10A of the total rated current of the connected cooking appliance |
   | plus 30% of the remainder of the total rated current of the connected appliance |
   | plus 5A if there is a socket outlet in the control unit. |

   Calculate, using diversity, a suitable rating for the protective device. **(8 marks)**

   b) Explain the following correction factors the application of which will have the effect of derating cable current capacity or conversely increasing cable size:

   (i) C_a
   (ii) C_g
   (iii) C_f and
   (iv) C_i **(8 marks)**

   c) A 6 kW load is to be supplied at 230V by a PVC sheathed and insulated twin and cpc copper cable, 8 metres in length. The cable is clipped on the surface through an area with an ambient temperature of 40°C and is grouped with three other cables of similar size and loading. The protection is by means of a BS 3036 fuse. Calculate the tabulated current-carrying capacity I_t (it is assumed in this example that all the correction factors need to be applied).

   Assume that the correction factors are C_a = 0.94, C_g = 0.65 and the correction factor for BS 3036 fuse = 0.725. **(4 marks)**