Table *Fuse to BS 88 Part 2 Rating*								
20A	32A	50A	63A	80A	100A	125A	160A	200A

Table *Ambient Temperature*								
Ambient temperature (^{0}C)	25	30	35	40	45	50	55	60
C_a	1.03	1.0	0.94	0.87	0.79	0.71	0.61	0.50

Table *Multicore 70^{0}C Armoured copper cables – Method E*		
Cross Sectional Area mm^2	Current carrying capacity (A)	Voltage drop mV/A/m
25	110	1.5
35	135	1.1
50	163	0.81
70	207	0.57
95	251	0.43
120	290	0.29
150	332	0.25

END OF EXAMINATION PAPER

DEPARTMENT OF EXAMINATIONS
THE MALL, SARRIA STREET, FLORIANA, MALTA

Examination for Authorisation B

Paper 2: **Electrical Installation Technology**

Date: **JULY 2021**

Time: **09:00 – 12:00 (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. Draw clear and well-labelled diagrams of the following DC generators. Your drawings must illustrate clearly the differences between each generator.

   i. A Series DC Generator with inter-poles and series field divider. **(4 marks)**

   ii. A Shunt DC Generator with inter-poles and shunt field regulator. **(4 marks)**

   iii. A Short Shunt Compound Generator with inter-poles and shunt field regulator. **(4 marks)**

   iv. A Long Shunt Compound Generator with inter-poles and shunt field regulator **(4 marks)**

   v. A Separately Excited Generator with DC supply, inter-poles and field regulator. **(4 marks)**

2. a) List three advantages of using XLPE cables instead of PVC steel wire armoured cables. **(6 marks)**

   b) With the aid of a diagram explain how a straight through joint is made on a 600/1000V, three core XLPE steel wire armoured cable. **(8 marks)**

   c) What precautions should be taken against corrosion when installing steel wire armoured cables underground? **(6 marks)**

3. Describe the system of wiring you would adopt for the following installations and conditions. You are expected to give reasons for your selection:

   a) A boiler house with high ambient temperature. **(5 marks)**

   b) A petrol station. **(5 marks)**

   c) A farm. **(5 marks)**

   d) A factory with many portable electric tools. **(5 marks)**

4. a) Describe a safe isolation procedure prior to working on an installation. **(9 marks)**

   b) With reference to 4 (a) above, list the equipment and accessories required for a safe isolation procedure. **(5 marks)**

   c) An electrical panel has burst into flames. Describe the procedure to extinguish the fire in the panel. Make reference to actions taken, type of equipment used and identification of equipment. **(3 marks)**

   d) You are working in a construction site and suddenly you note that another worker is being electrocuted. List at least three actions needed to be taken to rescue safely the other worker. **(3 marks)**

5. a) List the four factors on which the selection of a protective device depends. **(4 marks)**

   b) List the five essential requirements for a device designed to protect against overcurrent. **(5 marks)**

   c) State the advantages of a conduit, trunking and tray cable enclosure system for a commercial installation such as a shopping centre. It's important to consider the practical aspect of such systems. **(6 marks)**

   d) In five brief statements summarize the main requirements of emergency lighting. **(5 marks)**

6. A factory switchboard supplying the following load is to be connected to a 400V, 50Hz supply:

   - A 50kW three phase motor having a power factor of 0.8 lagging.
   - 20 single-phase motors each rated at 0.75 kW having a power factor of 0.75 lagging. These motors are to be distributed among the three-phase supply.
   - Lighting - 25Amps per phase with an effective power factor of 0.9 lagging.

   Calculate:

   i. The total current after applying diversity. **(4 marks)**

   ii. The power factor of this current. **(5 marks)**

   iii. The rating of the main fuse to BS 88 supplying the switchboard. **(2 marks)**

   iv. The size of the supply cable, which is 25m long and for which the allowable voltage drop is not to exceed 4 Volts. The cable to be used is 4 core PVC insulated SWA cable laid on a cable tray at a temperature of 50°C. **(9 marks)**

The following tables provides the necessary information to work out this problem.

Purpose of the final circuit	**Diversity to be applied**
50kW Motor	100% of the total current demand
0.75kW motors	80% of the total current demand.
Lighting Circuit	70% of the total current demand.