Question 1 – Meter Panel and Switchboard Wiring

The installation is a 3 Phase air-conditioned school, situated at 55 Blyth Road, Williamstown. All final sub-circuits must be RCD protected.

The following equipment is to be installed at the **main switchboard**:

- 1 – 3Φ 15kW air-conditioner
- 1 – 1Φ 5.6kW oven
- 1 – 1Φ 15A socket outlet
- 38 – 1Φ 25W luminaires, installed over two circuits

The following equipment is to be installed from the **distribution board** and controlled by an isolator:

- 1 – 1Φ 2.6kW storage water heater
- 5 – 1Φ 10A double socket outlets installed over two circuits
- 10 – 1Φ 12W LED downlights installed on a single circuit

Table C2 Column 3

Circuits	Load Group	Calculations	MD		
			Red	White	Blue
1 – 3Φ 15kW air-conditioner	(c) (i)	Full connected load of first appliance + 75% FLC of remainder **15000/(400/√3) = 21.65A** **(21.65x0.75 for red phase)**	16.24A	21.65A	21.65A
1 – 1Φ 5.6kW oven	(c) (i)	Full connected load of first appliance + 75% FLC of remainder **5600/230 = 24.35A**	24.35A		
1 – 1Φ 15A socket outlet	(b) (iii)	Full current rating of highest rated socket outlet + 75% of FLC of remainder **= 15A**		15A	
38 – 1Φ 25W luminaires	(a)	Full connected load **(38x25)/230 = 4.13A**		4.13A	

Equipment 1Φ Distribution Board					
Circuits	**Load Group**	**Calculations**	**MD**		
			Red	**White**	**Blue**
1 – 1Φ 2.6kW storage water heater	(g)	Full-load current 2600/230 **= 11.3A**			11.3A
5 – 1Φ 10A double socket outlets	(b) (ii)	1000W for first + 100W for each additional **(1000 + (9x100))/230 = 8.26A**			8.26A
10 – 1Φ 12W LED downlights	(a)	Full Connected Load **(10 x 12)/230 = 0.52A**			0.52A
Distribution Board MD					20.08A
Total Installation MD			40.59A	40.78A	41.73A

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Consumer's Mains	Table 3.12	Column 9 (O/H) or 17 (U/G)
Sub-main	Table 3.9	Column 9
Three phase load	Table 3.12	Column 9
Single phase loads	Table 3.15	Column 9

Maximum Demand of the Installation	Current Rating of the Main Switch	Size of the Consumer's Mains Cable		Size of the Main Earth Conductor	
		O/head	U/G	O/head	U/G
41.73A	50A	16mm²	10mm²	6mm²	4mm²

Maximum Demand of the Distribution Board	Current Rating of the Distribution Board Sub-main Circuit Protection	Size of the Sub-main Cable
20.08A	25A	4mm²

Location	Description	Circuit Loading (Table C9)	Circuit Breaker Rating	Cable Size	AS/NZS 3008
Main Board	1 - 3Φ 15kW air conditioner	21.65A	25A	4mm²	T3.12 C9
Main Board	1 - 1Φ 5.6kW oven	24.34	25A	4mm²	T3.15 C9
Main Board	1 - 1Φ 15A socket outlet	15A	16/20A	2.5mm²	T3.15 C9
Main Board	19 - 1Φ 25W luminaires	9.5/2.07A	10A	1.5mm²	T3.15 C9
Main Board	19 - 1Φ 25W luminaires	9.5/2.07A	10A	1.5mm²	T3.15 C9
Distribution Board	1 - 1Φ 2.6kW storage water heater	11.3A	16A	2.5mm²	T3.15 C9
Distribution Board	2 - 1Φ 10A double socket outlets	4A	16/20A	2.5mm²	T3.15 C9
Distribution Board	3 - 1Φ 10A double socket outlets	6A	16/20A	2.5mm²	T3.15 C9
Distribution Board	10 – 1Φ 12W LED downlights	5/0.52A	10A	1.5mm²	T3.15 C9

[Question 1 = 35 marks]

Question 2.8 – Testing of Operation of RCDs

Answer: No

Wiring Rules Clause Number: 2.6.2.4 (a) (ii)

[1 mark]

Question 3.2 – MEN System

1. (a) An MEN link and earth electrode must be installed at the distribution board.
2. (b) The In an active to earth fault, current flows through the protective earth to the MEN link and then through the sub-main neutral
3. (b) A touch voltage between accessible earthed conductive parts.
4. (d) Report the fault to the supply company.

[2 + 2 + 2 + 2 = 8 marks]