Unit	UEPOPS456A Perform switching to a switching program	Test Number	1/2
Total Marks	50	Time allowed	2 HR

Instruction to assessors
• Please provide the blank A4 sheets to students to write the answers on them • Please tell the students not to write on the question papers • Online test can also be supplemented. • The marking can be done by referring the attached marking guide • Giving the marks based on students' effort & demonstration of the absorbed study I& competency rather than the final answer is to made • The necessary formulas can be provided on the white board. • The formula which can be provided will be advised separately. • No notes, digital storage devices, programmable calculators are allowed. • Page 1 = Instruction to assessors & students • Page 2+(3)= Question Paper • Page (3)+4 and the remaining pages= Marking Guide
Instruction to students
• Write the answers on provided A$ blank sheets • Do write the answers on the question papers • Online test can also be supplemented. • The marking can be done by referring the attached marking guide • The necessary formulas can be provided on the white board on request.. • The formula which can be provided will be advised separately. • No notes, digital storage devices, programmable calculators are allowed.

Unit	UEPOPS456A Perform Switching to a switching program	Test Number	1/2
Total Marks	100	Time allowed	3 HR

Question (1)

Draw a block diagram of a power system from generation to utilization and on it show typical voltages.

2 marks

Question (2)

Sketch a radial feeder arrangement and state it's advantages and disadvantages.

2 marks

Question (3)

Explain the term joint use agreement as applied to poles in a distribution system.

2 marks

Question (4)

Outline a maintenance programme suitable to use by a distribution authority to ensure safety and reliability of poles used on it's system.

3 marks

Question (5)

Where are pole stays likely to be used on an overhead line? List the essential components for the staying of a pole.

3 marks

Question (6)

An underground cable is designed: 11KV 500 AL3 PHL SWZ. Give a full description of cable make up.

2 marks

Question (7)

A 3 phase load of 200KVA 50Hz is to have its power factor improved from 0.75 to 0.9. Calculate the size of capacitor bank required if the supply voltage is 415V. Sketch the connection.

3 marks

Question (8)

A transformer supplies a group of four feeders which have individual maximum demands of 2.5, 2.4, 4.3 and 1.6 MVA.

If the diversity factor of the system is 1.82 determine the maximum demand on the transformer.

3 marks

Question (9)

The conductor to be erected over a 160 m span has an equivalent weight of 4 N/m, diameter of 12 mm and ultimate tensile strength of 33KN.

Determine the sag which must be provided on erection if it is desired to allow for wind loading of 500 Pa and safety 3.5.

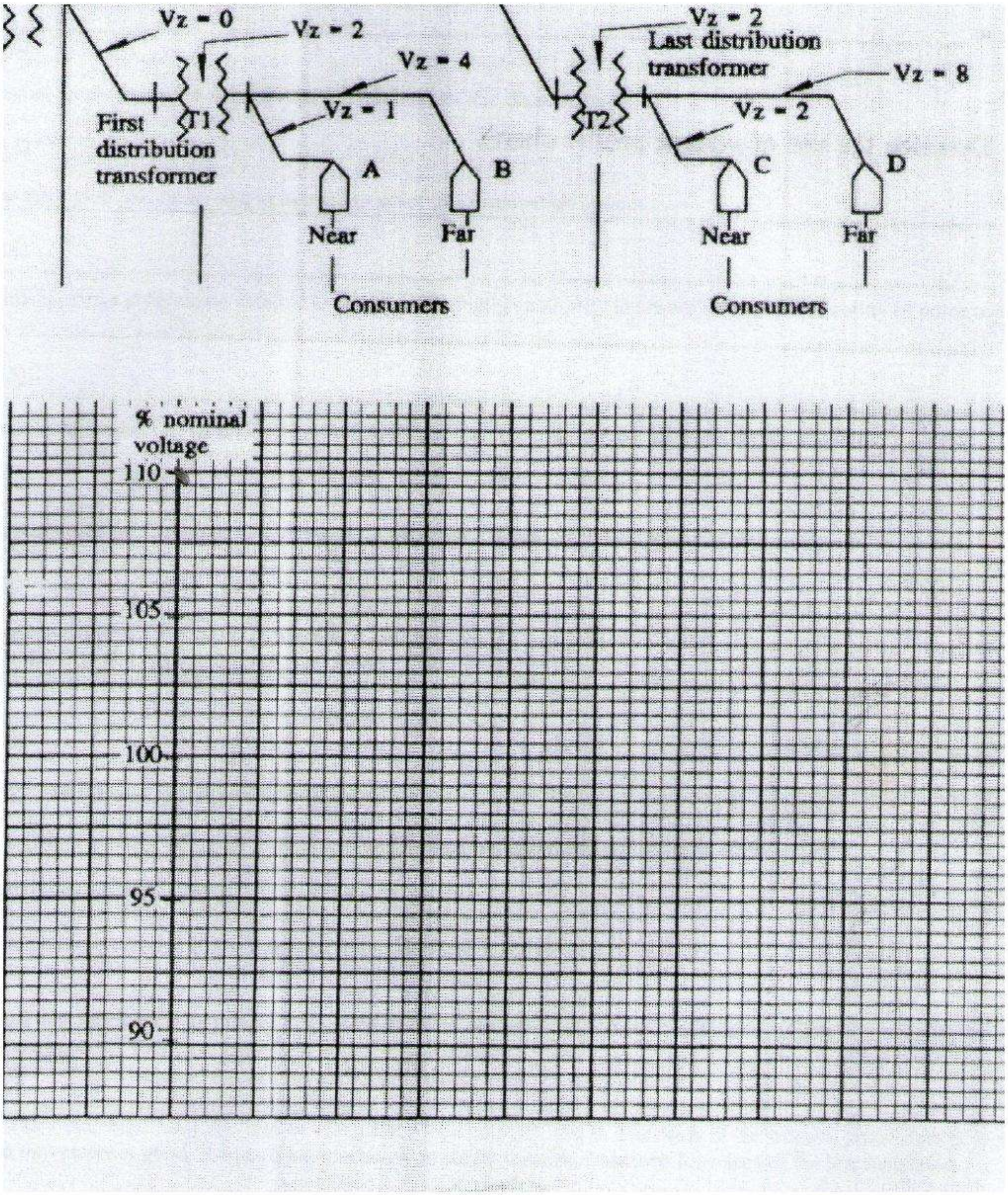
4 marks

Question (10)

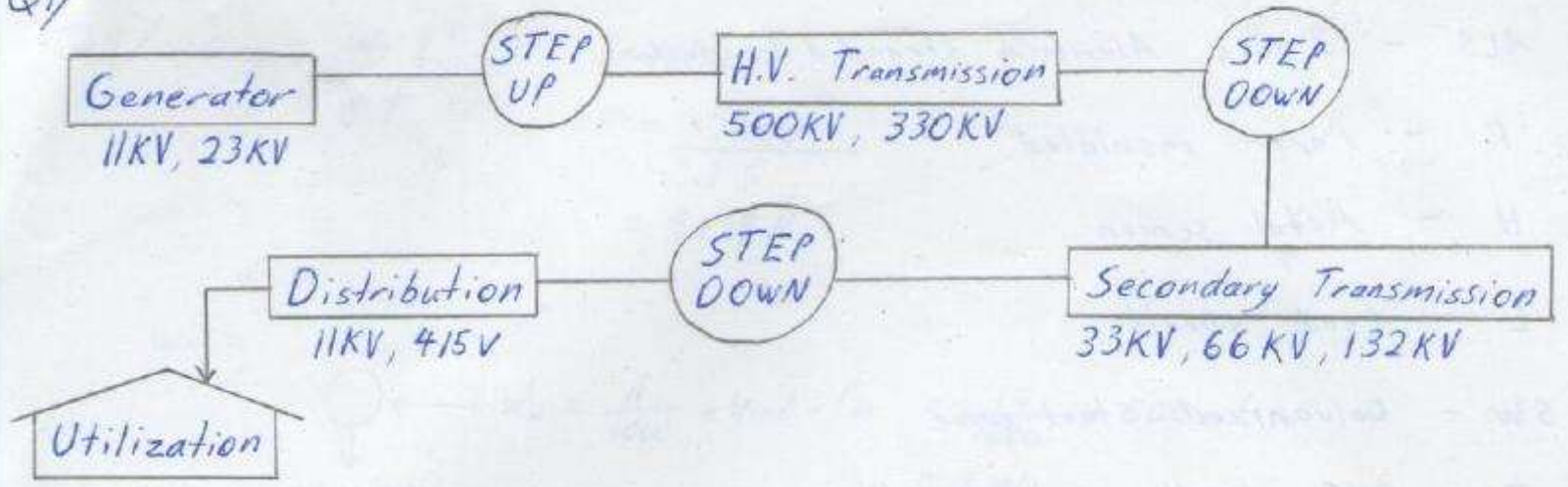
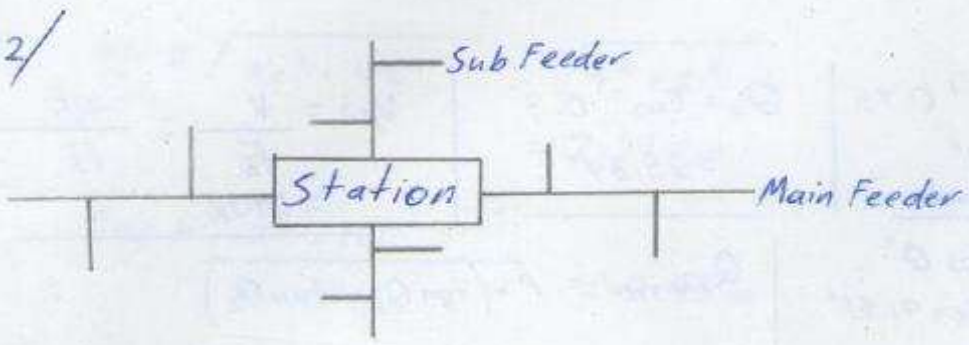
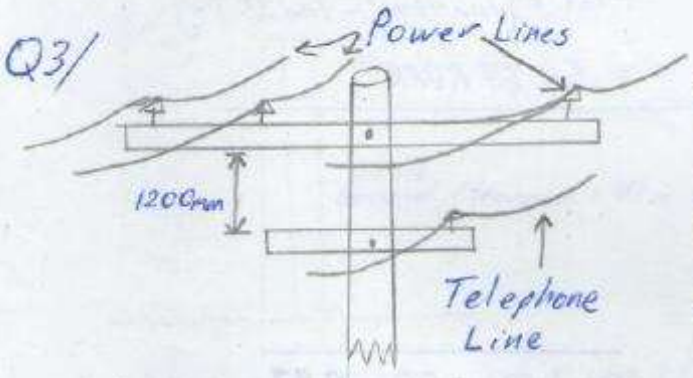
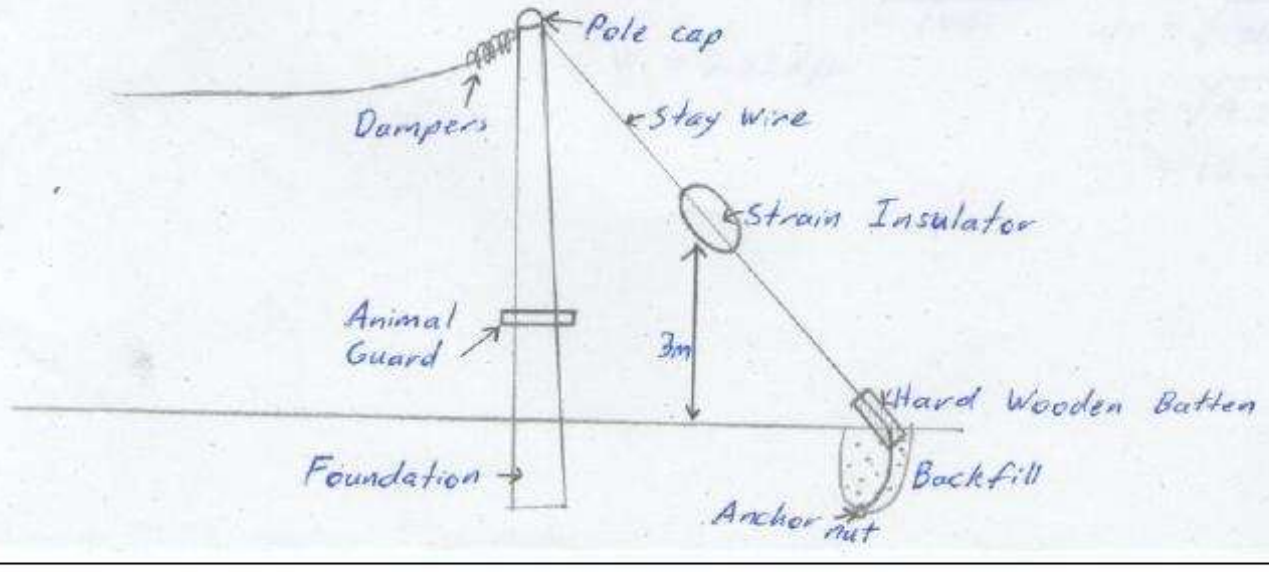
A 3 phase , 11kV overhead rural line is to be erected between points A and B. The route of the wooden pole line is straight and the soil resistance to movement is good. Standard pin insulators on single wooden crossarms form part of the line insulation.

(a) Nominate the ground clearance you would recommend and indicate details relating to this decision
(b) The maximum conductor design sag has been set at 1.0m. Indicate a suitable pole planting depth and determine the total length of pole.
(c) If the termination poles are located at A and B, what would be the most economical number of poles for the power line of 3.0 km in length? Details of the conductor to be used are shown below:

Mass per 100 m	=	43 kg
Wind loading	=	750 Pa
Equivalent diameter	=	16 mm


Vz = 0
Vz = 2
Vz = 4
Vz = 1
First distribution transformer
T1
A
B
Near
Far
Consumers
Vz = 2
Last distribution transformer
T2
Vz = 8
Vz = 2
C
D
Near
Far
Consumers
% nominal voltage
110
105
100
95
90

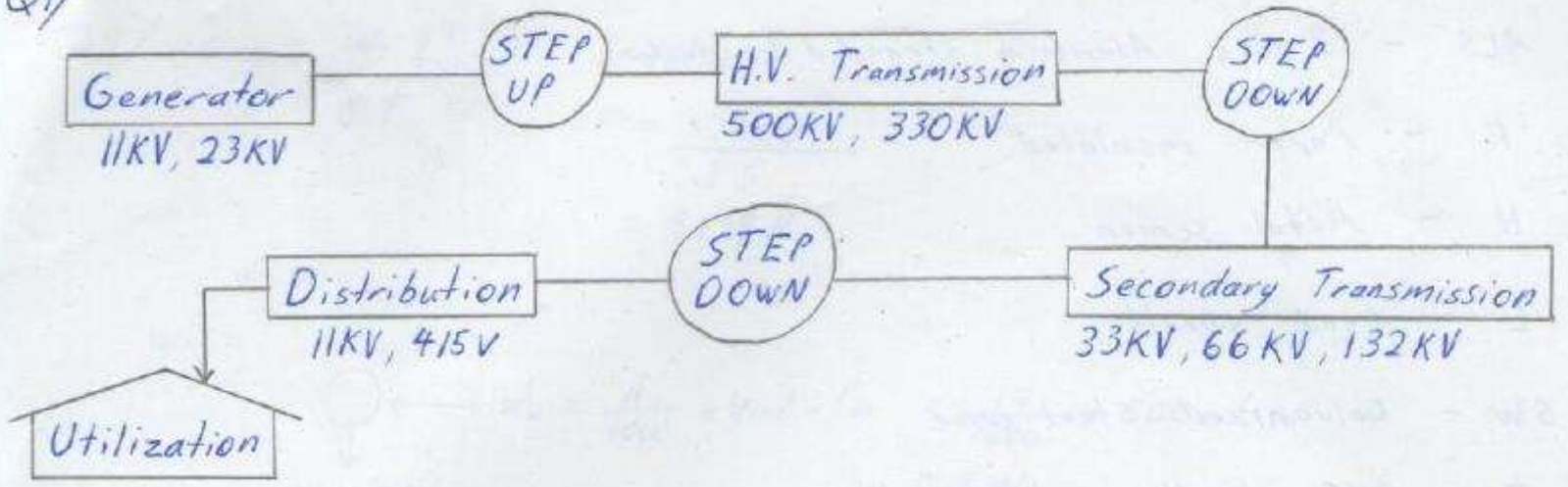
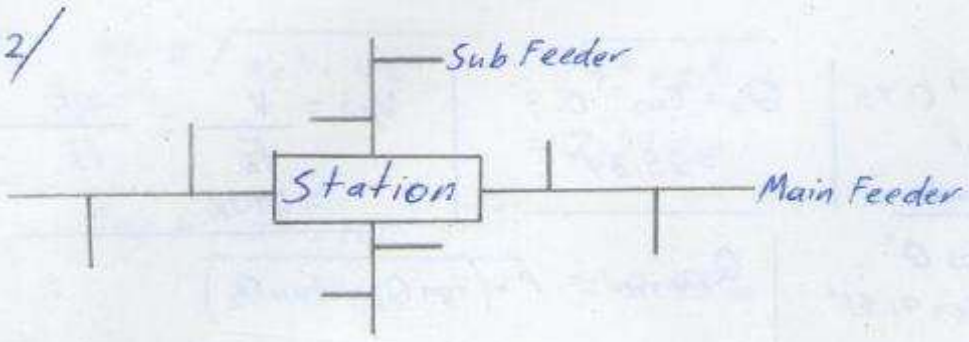
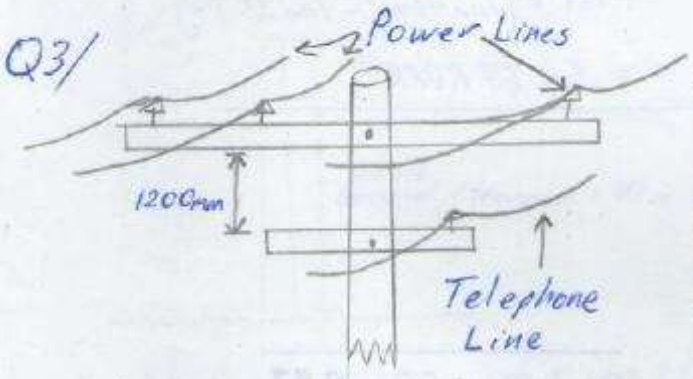
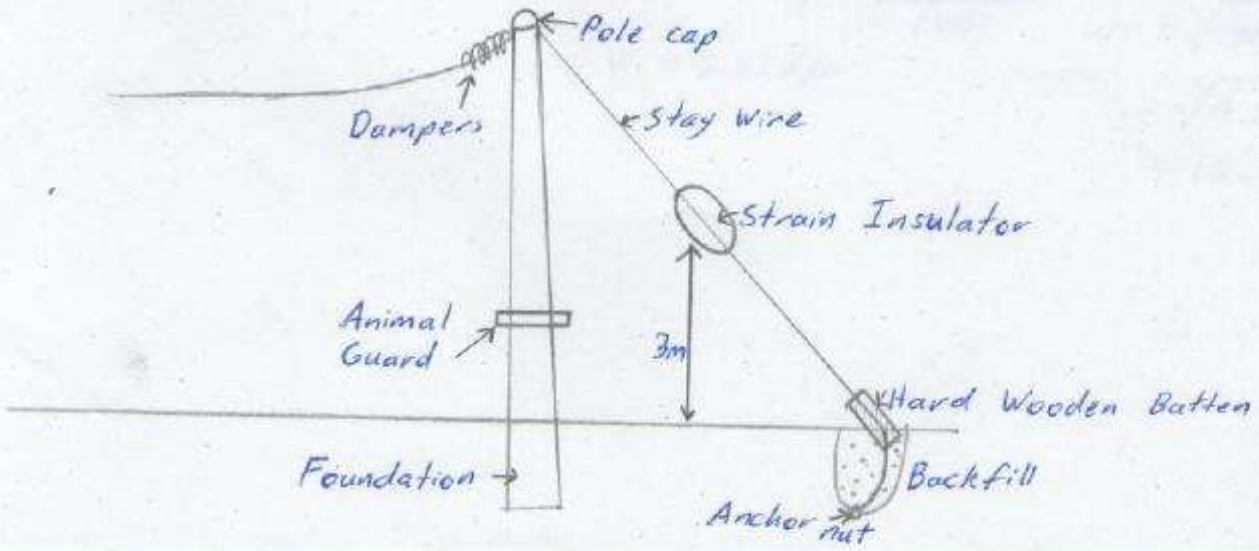
Unit		Test Number	
Total Marks		Time allowed	

Answer	Marks
2/6/09 Electrical Distribution Test 3 , Page 1 39/40 Daniel Fernandez 331470953 Q1/  	5
Q2/  Advantages: Cheap and easy to build. Disadvantages: Unreliable, only uses one source.	5
Q3/  The joint use agreement is a term used to describe the agreement by the Power and Telephone company to share the pole for their networks ~~+~~ instead of each building their own.	5
Q4/ Every Six months to a year the pole is inspected and a layer of charcoal is applied. Then Every 2 years to 3 years the soil around the pole is inspected and infestion of incests is checked.	5
Q5/ Pole stays are used on the termination of overhead lines.  	5

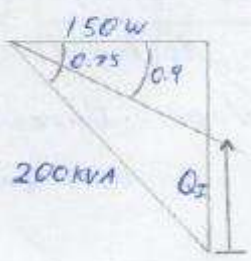
Unit		Test Number	
Total Marks		Time allowed	

Answer	Marks

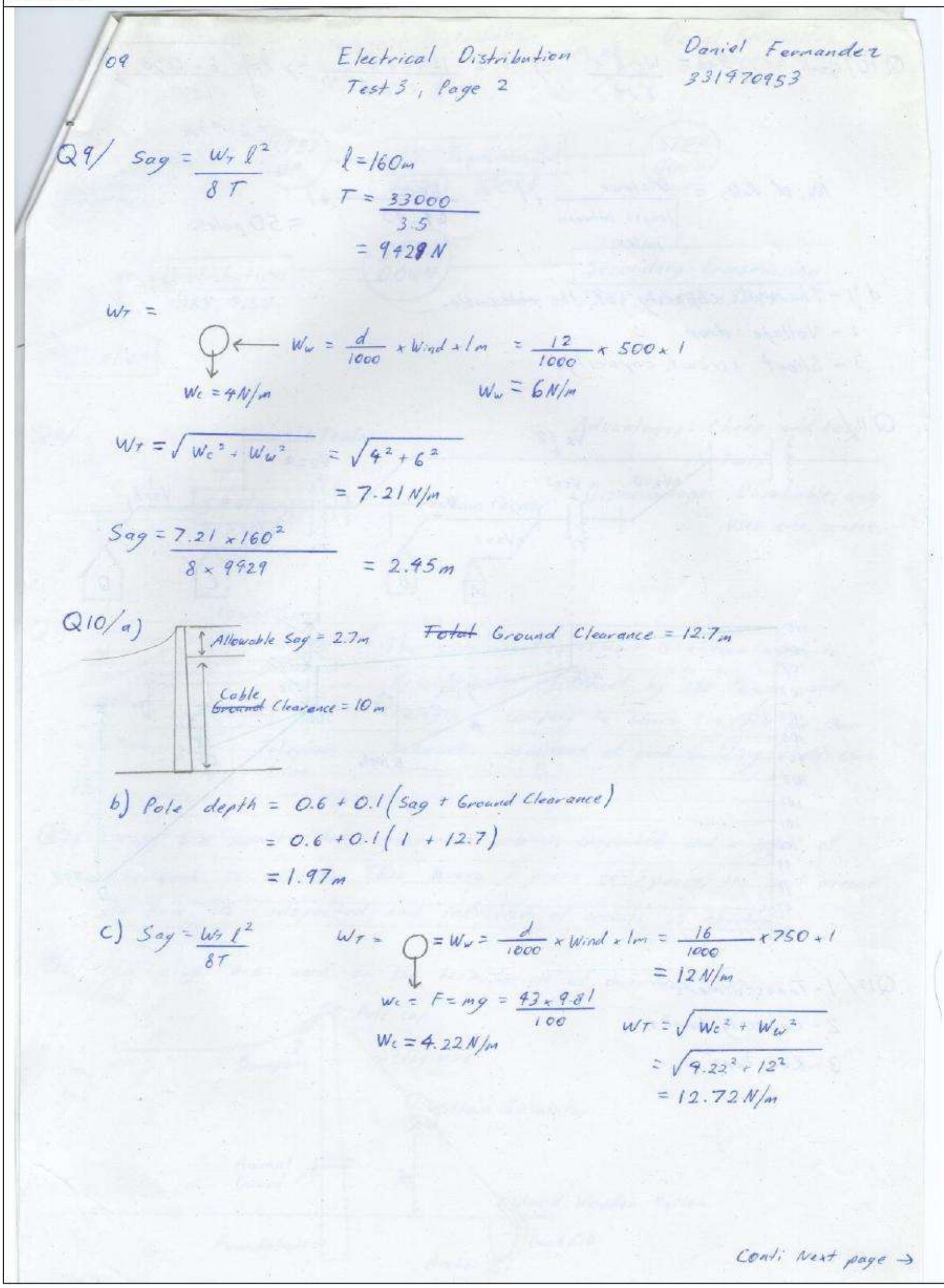
Unit		Test Number	
Total Marks		Time allowed	

Answer	Marks
2/6/09 Electrical Distribution Test 3 , Page 1 39/40 Daniel Fernandez 331470953 Q1/  	5
Q2/  Advantages: Cheap and easy to build. Disadvantages: Unreliable, only uses one source.	5
Q3/  The joint use agreement is a term used to describe the agreement by the Power and Telephone company to share the pole for their networks ~~+~~ instead of each building their own.	5
Q4/ Every Six months to a year the pole is inspected and a layer of charcoal is applied. Then Every 2 years to 3 years the soil around the pole is inspected and infestion of incests is checked.	5
Q5/ Pole stays are used on the termination of overhead lines.  	5

Unit		Test Number	
Total Marks		Time allowed	

Answer	Marks
Q6/ 11kV – 11Kv line 500 – 500mm² Conductor size AL3 – 3 core Aluminium stranded conductor P – Paper insulated H – Metal screen L – Lead sheath SW – Galvanized Steel wire Z – PVC sheath.	5
Q7/  $Q_1 = \cos^{-1} 0.75 = 41.41°$ $Q_2 = \cos^{-1} 0.9 = 25.84°$ $V_{ph} = \frac{V}{\sqrt{3}} = \frac{415}{\sqrt{3}} = 240V$ $P = S \times \cos\theta° = 200 \times \cos 41.41° = 150\,W$ $Q_{Improved} = P \times (\tan Q_1 - \tan Q_2) = 150 \times (\tan 41.41° - \tan 25.84°) = 59.64\,KVAR$ $Q = \frac{V^2}{X_C} \rightarrow X_C = \frac{V^2}{Q} = \frac{240^2}{59.64K} = 0.97\Omega$ $X_C = \frac{1}{2\pi fC} \rightarrow C = \frac{1}{2\pi f X_C} = \frac{1}{2 \times 3.1416 \times 50 \times 0.97} = 3.3mF$	5
Q8/ Maximum Demand $= \frac{\text{Sum of demand}}{\text{Diversity factor}} = \frac{2.5 + 2.9 + 4.3 + 1.6}{1.82} = 5.93MVA$	5

Unit		Test Number	
Total Marks		Time allowed	

Answer	Marks
	5
	5

Unit		Test Number	
Total Marks		Time allowed	

Answer	Marks
Q10/ c) conti	20
Q11/	30

Q10/ c) conti

$$Sag = \frac{W_T\, l^2}{8 \times T} \Rightarrow 1 = \frac{12.72 \times l^2}{8 \times 6000} \Rightarrow l = \sqrt{\frac{8 \times 6000}{12.72}}$$

$$= 61.43\,m$$

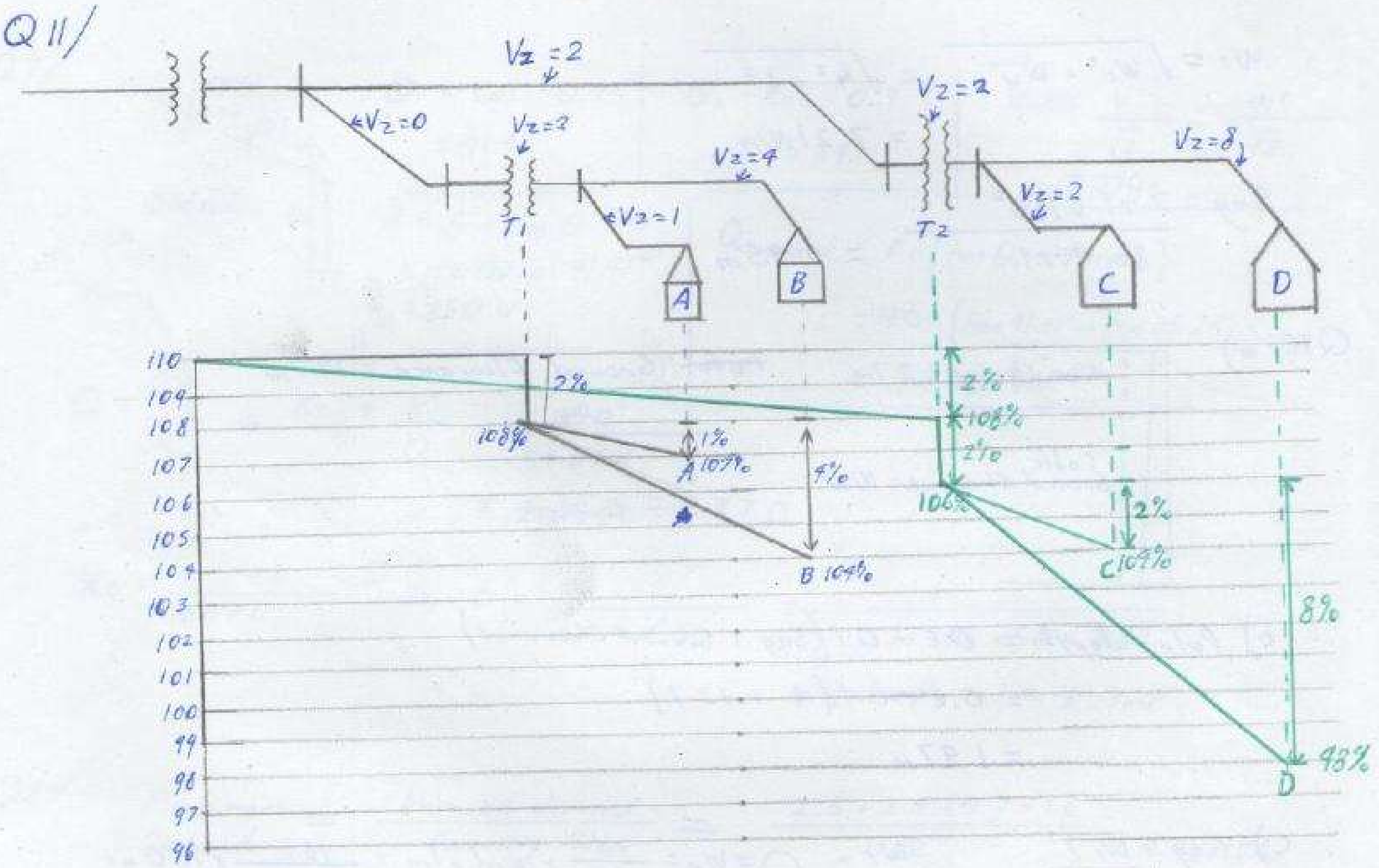
$$\text{No. of Poles} = \frac{\text{Distance}}{\text{length between poles}} + 1 = \frac{3000}{61.43} + 1 = 50 \text{ poles.}$$

d) 1 - Thermal capacity of the ~~pole~~ cable.

2 - Voltage drop

3 - Short circuit capacity.

Q11/



Q12/ 1 - Transformers

2 - Capacity banks

3 - Reactors