

Candidate Name:	
Hand out date	
Hand in date	
Actual submission date	
Date returned to student	
Assessor name	

Achievement		
Criteria	R1	Pass
P1		
P2		
P3		
M1		
D1		

Student Declaration:

I declare that the work submitted for the assessment is my own work. Any work of any other person is properly credited and referenced.

Signed.....

Date:

Learning Outcomes Considered

LO1 Investigate the constructional features and applications of electrical distribution systems

Assessment Brief

All PASS questions are compulsory; MERIT and DISTINCTION questions should be attempted.

*You will be provided with formative feedback and have **ONE** opportunity to revisit your work to add to the original evidence produced to consolidate work to a pass grade.*

All workings should be shown as credit can be given for an incorrect answer providing an appropriate method has been used.

Copied work will not be graded.

Brief Internally Verified

Internal Verifier: W Hocking

Internal Verifier Signature:



Date: 29/10/18

Assignment	
Date	
Student Name	
Received by	

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Assessment Criteria	Evidence Required	Achieved Y/N (Date)	Assessor's Feedback (Brief Comment only and include Page Reference of student script)
P1	<i>Describe the features of an electrical distribution system.</i>		
P2	<i>Review the electrical component symbols used in circuit diagrams.</i>		
P3	<i>Explain the different methods of single and three- phase connections.</i>		
M1	<i>Summarise the methods of safe fault finding on an electrical distribution system.</i>		
D1	<i>Examine the operation of an electrical distribution system.</i>		

Assessor's Feedback

{Summative feedback}

Assessor Signature: _____ **Date:** _____

Student Comments

I certify that I have read and agree with the assessor's feedback.

Student Signature: _____ **Date:** _____

- *To pass this assignment, your answers for each task related to the pass criteria must be full and substantially correct.*
 - *To achieve merit or distinction, your answers for each task related to the merit and/or distinction criteria must be full and substantially correct.*
 - *Merit and Distinction grades will be awarded at the first submission, only.*
-

Electrical systems stretch from electrical power generation through the national grid, finally to the end user. The end user can be widely varied from the home through to heavy industry and more. Electricity is used to drive electric motors in heavy industry through to powering a television in your front room at home. A versatile but necessary commodity for a modern day life. As an electrical apprentice, you should be aware of the safe and efficient electrical distribution system.

For the electrical distribution system indicated in figure 1 below, indicate the typical voltages that can be found at the points of transmission within the system shown as 3, 5, 7 & 9 and indicate why these values are used throughout the system with reference to the UK distribution grid.

Point 1 is the power plant and generation for the network, give descriptions as to the types of generation that can be used and the relevant voltages that may be derived from generators, indicating why there are limits to voltage levels and considerations / requirements of connections to the grid network.

Indicate the advantages of using high voltages for transmission networks over long distances and why AC is the preferred method.

There are relevant points shown within the systems as blocks 2, 4, 6 & 8, describe the nature of these devices and give some typical rating values of the devices that may be found on the grid system.

Indicate the three phase connection methods and the significance of point 10.

A range of different voltages can be found within transmission systems with the final voltages being an 11kV to 400/230V system. This requires the final conversion device to be of a particular type to allow the production of the dual supply voltage. Explain how the dual voltage is derived from the conversion and how the device is connected on the HV side and the MV side.

Give an indication of other devices that may be found in a distribution network giving a brief explanation of the devices function e.g. a surge arrester

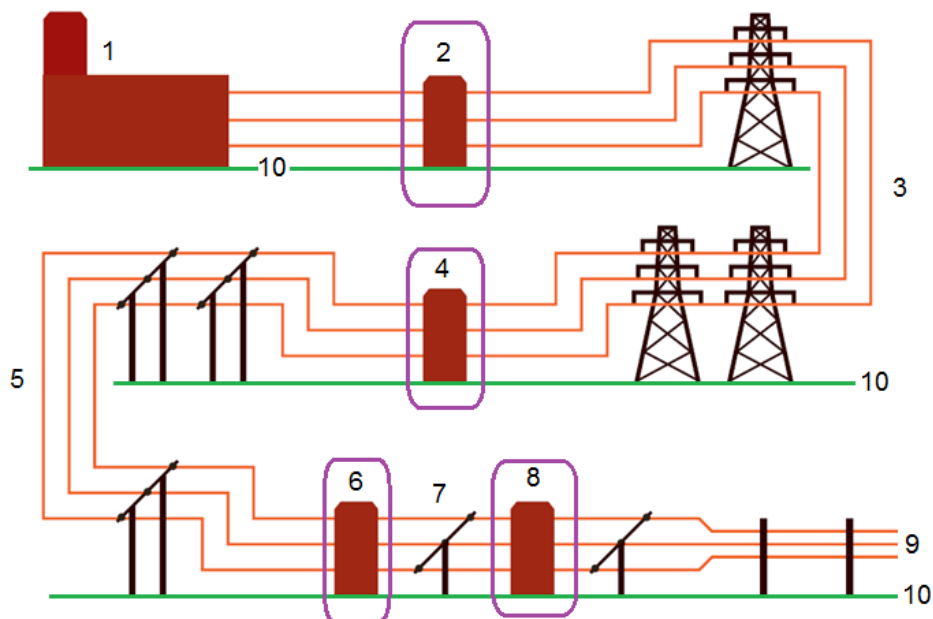


Figure 1.

Circuit diagrams and schematic diagrams are used from the design stage, install stage, operation stage through to fault finding etc. It is vital that electrical and electronic symbols and diagrams are used correctly so everyone involved through the lifecycle of the device fully understands the diagram notation.

With circuit diagrams and schematic diagrams there are a number of different symbols that can be used such as ANSI and DIN for circuits and EIC and JIC for symbolic.

Draw and review the component symbols for the items listed below from different standards and briefly explain the difference between a schematic and a circuit diagram and where each may be used

- Emergency stop / start button / stop button
 - Three phase delta to star transformer
 - Three phase motor thermal cut-out
 - Three phase contactor
 - Single phase motor capacitor
 - Circuit breaker
 - Fuse
-

In industry, there are many machines which make the use of three phase motors for forward and reverse operation, some have variable frequency speed control. There is a low voltage control circuit together with a high voltage 400V circuit connecting to the three phase supply and motor contacts etc.

In the circuit shown in figure 2 below, motor start, forward and reverse. The machine is assumed to be drawing 6 times the full load current on start up.

Using a standard 400V three phase supply and a load impedance of $3 + j4$ per phase show how the current is reduced for a star/delta starting system

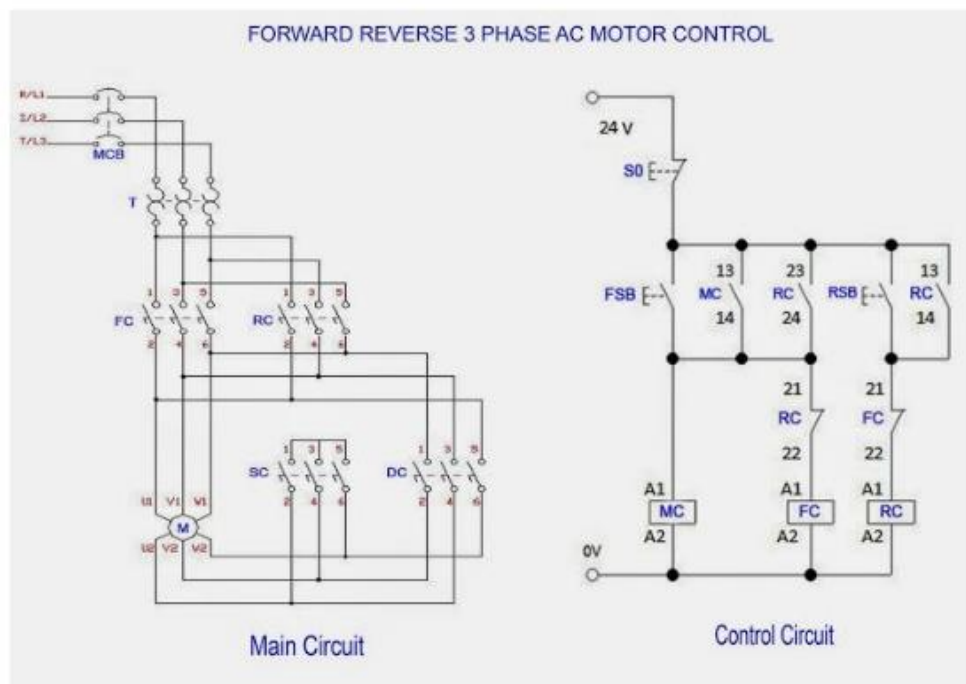


Figure 2

Show (with the aid of a diagram) how a single phase system can be derived from a 3 phase network and explain why the line voltage of a 3 phase UK system is 400V and the single phase (phase voltage) is 230V

Unfortunately, things go wrong and when they do, fault finding should always be carried out safely and effectively. Making full use of maintenance procedures, circuit diagrams, schematics and suitable test equipment

Making reference to approved test equipment and Health and Safety, summarise how you would go about effective, safe fault finding for the following:

With reference to the circuit in figure 3, before the wire link fuse in the fuse box failed, there was no output from socket 3 or 4.

What type of circuit is this and how would you go about locating and repairing the fault?

How could safety be improved to this circuit and what procedures would you use as you go about the work.

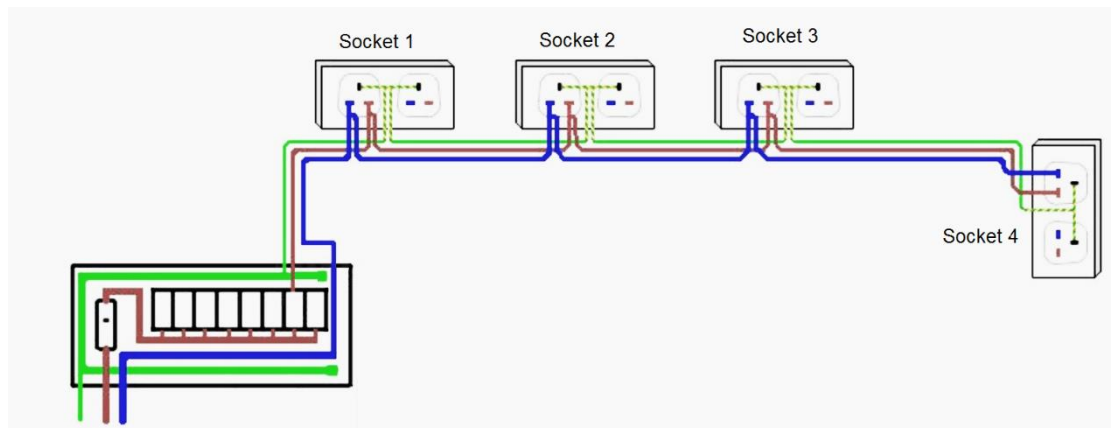


Figure 3

A three phase system feeds a motor. How would you go about testing for the suspected loss of one of the phases to the motor?

For the faults indicated above:

- Which fault finding method/s would best be selected for use
- Why you might use a particular fault finding technique
- How would you use the selected fault-finding technique?

In the UK there is a national grid system that enable a full linkage of power stations across the country to enable supply to be maintained and distributed across any distance. Within this system there are various primary methods of generation such as coal power plants, wind farms, hydro and pumped storage hydro systems. There are also links across continent to France which is DC in nature.

With the aid of diagrams* explain how the system functions and the relative voltage levels that are used to distribute energy across the network, with particular reference to the type of power stations used in various locations e.g. nuclear and pumped storage, where they are in the country related to load requirements.

* This can include network / location diagrams from the national grids website or documentation.

---- End of assignment ----