

Powerline
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Transmission Overhead Powerline Pre-Assessment Questionnaire

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The purpose of this pre-assessment questionnaire is to test your knowledge of the electrical supply industry and the requirements of the Australian transmission qualification *UET30521 Certificate III in ESI -Transmission Overhead.*

Question 1 Dogging and Rigging

What are the common safety rules when using rigging equipment? (List four)

- 1.
- 2.
- 3.
- 4.

Question 2 Dogging and Rigging

The rating of a 1000kg SWL fibre sling is affected in which way if rigged in the following fashion?

- 1. Choked around an attachment point.....
.....
- 2. Placed around an attachment point in a basket fashion.....
.....

Question 3 Dogging and Rigging

Should you find defective rigging equipment what process must be followed?

.....
.....

Question 4 Mobile Plant

Why must a safety exclusion zone be established around an EWP or CRANE when in the working mode?

.....
.....

Question 5 Mobile Plant

Prior to using a CRANE or EWP what safety precautions must be taken?

1.
2.
3.
4.

Question 6 Mobile Plant

What form of communication must be used when directing a crane operator?

- Verbal
- Hand signals
- Two-way radio
- Whistle

Question 7 Workplace Health and Safety

Give a brief explanation as to the aims and objectives of Workplace Health and Safety Acts?

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Question 8 Workplace Health and Safety

In relation to Workplace Health and Safety give a brief explanation as to employer and employee responsibilities

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.....

.....

Question 9 Workplace Health and Safety

In the correct order number, the steps of the hierarchy of control

- Elimination
- Isolate
- Substitution
- Engineering Controls
- Personal Protective Equipment (PPE)
- Administrative Controls

Question 10 Workplace Health and Safety

What is the three-step process for identifying hazards?

1.
2.
3.

Question 11 Workplace Health and Safety

What document is used to identify tasks, record the hazards and record the control measures?

- Procedure
- Safe work method statement
- Job safety analysis
- Risk assessment

Question 12 Fabricate, Assemble and Dismantle Industry Components

Name three types of tower members that could be shown on a structural drawing.

1.
2.
3.

Question 13 Fabricate, Assemble and Dismantle Industry Components

What tools are required for accurate measuring and marking out? (*i.e. preparing to press a midspan joint*)

.....

.....

Question 14 Fabricate, Assemble and Dismantle Industry Components

What type of drilling machine and drill bit is required when drilling major tower steel? (*i.e. leg steel*)

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Question 15 Fabricate, Assemble and Dismantle Industry Components

List the hand tools required to erect a transmission tower structure

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Question 16 Fabricate, Assemble and Dismantle Industry Components

List three safety rules when using portable electric tools

1.
2.
3.

Question 17 Solve Problems in D.C. Circuits

Name three uses for Direct Current (D.C.) in the electrical supply industry

1.
2.
3.

Question 18 Solve Problems in D.C. Circuits

Name three factors that can affect conductor current ratings

1.
2.
3.

Question 19 Solve Problems in D.C. Circuits

Name the three main types of electrical meter

1.
2.
3.

Question 20 Fix and Secure Electrotechnology Equipment

When fixing and securing equipment to a tower structure what materials are used? (*i.e. OPGW down leads*)

-
-

Question 21 Drawings and Diagrams

What sort of mechanical drawing shows all the components of an item of equipment pulled apart?

- Exploded view
- Multi view
- Section view
- Auxiliary view
- Pattern view

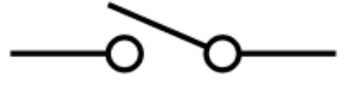
Question 22 Drawings and Diagrams

What type of drawing would show the sag of conductors in relation to the land surface?

- Line route drawing
- Terrain drawing
- Profile drawing
- Line over view drawing

Question 23 Drawings and Diagrams

Identify the following symbols

Symbols	Answer
	
	
	
	

Question 24 Electromagnetic Devices and Circuits

Name five key terms in magnetism and electromagnetism

1.
2.
3.
4.
5.

Question 25 Electromagnetic Devices and Circuits

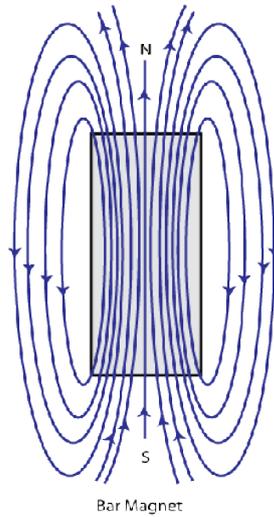
From the statements below what are the main factors affecting inductance in an inductor?

- The shape and dimensions of the coil
- The presence of magnetic material

Question 26 Electromagnetic Devices and Circuits

In the sketch below what are the lines commonly referred to?

Answer:



Question 27 Electromagnetic Devices and Circuits

Name the three main types of rotating machines

1.
2.
3.

Question 28 Low Voltage A.C. Circuits

Name three advantages of Alternating Current (A.C.)

1.
2.
3.

Question 29 Low Voltage A.C. Circuits

Name three main resistive components in the electricity supply industry

1.
2.
3.

Question 30 Low Voltage A.C. Circuits

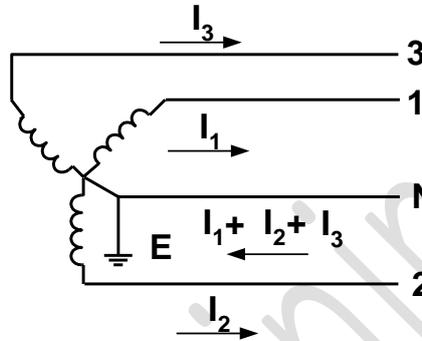
Does current in an inductor lag or lead voltage in an a.c. circuit?

- Lag
- Lead

Question 31 Low Voltage A.C. Circuits

In the system below, if the currents in 1 and 2 phases are 300A and the current in phase 3 is 350A what is the current in the neutral?

- 50A
- 60A
- 30A
- 40A



Question 32 Low Voltage A.C. Circuits

In the space below draw the Ohm's law triangle and populate it with the common formulas

Question 33 Sustainable Energy and the Environment

What are the employee's responsibilities regarding environmental issues?

.....
.....
.....

Question 34 Sustainable Energy and the Environment

Regarding the environment what is meant by Best Practice?

.....
.....
.....

Question 35 Sustainable Energy and the Environment

Give an example of two types of sustainable energy sources

1.
2.

Question 36 Sustainable Energy and the Environment

What does SDS stand for?

.....
.....

Question 37 Sustainable Energy and the Environment

What extra items of PPE are required when handling hazardous substances?

1.
2.
3.
4.

Question 38 Operating Plant and Equipment Near Live Electrical Apparatus

What precautions are taken when operating any item of plant or equipment near live electrical apparatus?

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.....
.....
.....

Question 39 Operating Plant and Equipment Near Live Electrical Apparatus

When do Safe Approach Distances apply to Mobile Plant?

- When mobile plant is in the working mode
- When positioning mobile plant
- When traveling to the designated work area
- Only when plant prohibition signs and barriers have been erected

Question 40 Working Safely Near Live Electrical Apparatus

What precautions are taken when personnel are working near live electrical apparatus?

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Question 41 Working Safely Near Live Electrical Apparatus

Populate the table below with the Safe Approach Distances for an authorised person working near live conductors for your state/territory

Voltage	Authorised Person	Voltage	Authorised Person
22kV		220kV	
66kV		275kV	
110kV		330kV	
132kV		500kV	

Question 42 Install and Maintaining Poles

List three common types of poles used for transmission powerline networks

1.
2.
3.

Question 43 Erect and Maintain Transmission Powerline Structures

Name the nine above ground components of a transmission powerline tower structure

1.
2.
3.
4.
5.
6.
7.
8.
9.

Question 44 Erect and Maintain Transmission Powerline Structures

What is a suspension transmission tower structure designed to support?

- | | |
|--|---|
| <input type="checkbox"/> The weight and wind loading of the conductors | <input type="checkbox"/> The weight of the hardware |
| <input type="checkbox"/> The weight and wind loading of the groundwire | <input type="checkbox"/> The weight of insulators and conductor |

Question 45 Erect and Maintain Transmission Powerline Structures

What loads, and forces are transmission powerline strain/termination towers designed to withstand?

- | | |
|---|---|
| <input type="checkbox"/> Pull from conductors | <input type="checkbox"/> Unbalanced forces from construction and conducting |
| <input type="checkbox"/> Changes in direction | <input type="checkbox"/> The weight and wind loading of the conductors |

Question 46 Erect and Maintain Transmission Powerline Structures

What is the normal maximum deviation for a suspension tower?

- | | |
|-------------------------------------|-------------------------------------|
| <input type="checkbox"/> 5 degrees | <input type="checkbox"/> 2 degrees |
| <input type="checkbox"/> 10 degrees | <input type="checkbox"/> 12 degrees |

Question 47 Erect and Maintain Transmission Powerline Structures

What forces are applied to a transmission powerline tower foundation?

- Pushing downwards
- Pulling upwards
- Sideways

Question 48 Erect and Maintain Transmission Powerline Structures

Identify the foundation in the image and explain where this type of foundation might be used when constructing transmission lines

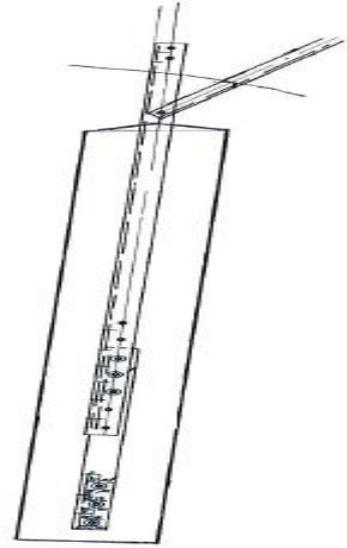
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Question 49 Erect and Maintain Transmission Powerline Structures

Identify the foundation in the image and explain where this type of foundation might be used when constructing transmission lines

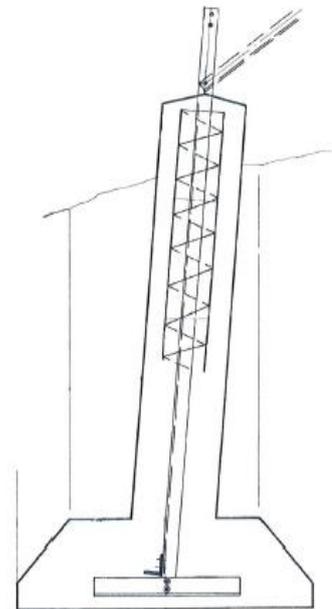
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Question 50 Install and Maintain Transmission Powerline Hardware

Identify the item of hardware shown and where it would be used on a tower structure

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Question 51 Install and Maintain Transmission Powerline Hardware

Identify the item of hardware shown and where it would be used on a tower structure

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Question 52 Install and Maintain Transmission Powerline Hardware

Identify the item of hardware shown and where it would be used on a tower structure

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.....
.....



Question 53 Install and Maintain Transmission Powerline Hardware

Identify the item of hardware shown and where it would be used on a tower structure

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.....
.....



Question 54 Install and Maintain Transmission Powerline Hardware

Identify the item of hardware shown and where it would be used on a tower structure

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.....
.....



Question 55 Install and Maintain Transmission Powerline Conductors

Name three insulator types used on transmission powerlines

1.
2.
3.

Question 56 Install and Maintain Transmission Powerline Conductors

Name three groundwire/earthwire types

1.
2.
3.

Question 57 Install and Maintain Transmission Powerline Conductors

In ACSR what provides the tension strength?

.....
.....

Question 58 Install and Maintain Transmission Powerline Conductors

From the list below identify the plant and equipment required to string transmission overhead conductors

- | | |
|--|--|
| <input type="checkbox"/> Capstan winch | <input type="checkbox"/> Hydraulic press (mid span and termination jointing) |
| <input type="checkbox"/> Hiab crane and winch | <input type="checkbox"/> Conductor pulling and tensioning machines |
| <input type="checkbox"/> Draw wires or ropes | <input type="checkbox"/> Conductor running sheaves |
| <input type="checkbox"/> Cable trailers or drum stands | <input type="checkbox"/> Conductor swivels |

Note: please list any other plant and equipment requirements

.....
.....
.....

Question 59 Install and Maintain Transmission Powerline Conductors

From the list below complete the conductor abbreviations

- 1. ACSR/GZ.....
- 2. AAAC.....
- 3. AAC.....
- 4. ACSR/AC.....

Question 60 Install and Maintain Transmission Powerline Conductors

What document is required to confirm a transmission powerline has been de-energised?

- Safe work method statement (SWMS)
- Electrical access permit (EAP)
- Electrical access authority (EAA)
- Job safety analysis (JSA)

Question 61 Install and Maintain Transmission Powerline Conductors

Explain why there is a need to earth transmission powerlines for de-energised/earthed line work?

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.....

.....

Question 62 Install and Maintain Transmission Powerline Conductors

What procedure is used to confirm transmission powerline conductors are de-energised prior to applying a portable earth?

- Buzz test the conductors
- Sign onto and electrical access permit (EAP)
- Voltage detection unit (VDU)
- Ask the team leader/supervisor

Question 63 Install and Maintain Transmission Powerline Conductors

Name two possible causes of dangerous voltages that can be induced in conductors as they are being strung

- Accidental energising of a line
- Induced voltages from nearby lightning
- Induced voltages from powerlines
- Voltages from direct lightning strikes

Question 64 Install and Maintain Transmission Powerline Conductors

Identify from the list two commonly used items of earthing equipment required when stringing conductors

- Earthing rods
- Conductor earths
- Earth mats (grids)
- Running earths

Question 65 Install and Maintain Transmission Powerline Conductors

Identify from the list the common causes of external damage to conductors

- Tree contact
- Accidental contacts
- Lightning strikes
- Incorrect, unsuitable or poorly installed fittings

Question 66 Install and Maintain Transmission Powerline Conductors
Using the formula below calculate the conductor weight at the clamp

Formula: $\frac{1}{2}$ span 1 + $\frac{1}{2}$ span 2 distance X the weight of the conductor
Bison conductor (1.490kg/m), Span 1 = 250mtrs and Span 2 = 270mtrs

Answer:

Question 67 Install and Maintain Transmission Powerline Conductors
Using the formula below calculate the conductor tension

To calculate this force, the following formula is to be used.

Note: W x Span length is divided by 8 X Sag

$$T = \frac{W \times \text{Span length}^2}{8 \times \text{Sag}}$$

- T = Tension
- W = Weight of the conductor per metre
- 8 = A constant
- Sag = the sag is measured in metres

Information needed to complete this calculation

- Canary conductor (1.690kg/m)
- Span length is 275 metres
- Sag is 2.5 metres

Answer:

Question 68 Inspect Overhead Structures and Electrical Apparatus

What are the common faults that may cause the integrity of a transmission powerline structure to fail?

- Deterioration of steel components
- Deterioration of concrete foundations
- Heavy pollution (salt, chemicals)
- Corrosion due hash environment
- Wear due to wind loading

Question 69 Inspect Overhead Structures and Electrical Apparatus

From the list below identify the main deterioration processes for hardware

- Wear
- Aging
- Corrosion
- Heavy contamination

Question 70 Inspect Overhead Structures and Electrical Apparatus

Identify three reasons for replacing conductor joints

- The joint resistance significantly exceeds a specified limit
- The joint exhibits signs of severe internal corrosion or bulging
- Where the differential temperature rise is measured as greater than 30°C
- The joint exhibits visually obvious signs of overheating

Question 71 Inspect Overhead Structures and Electrical Apparatus

Why is it important to inspect transmission powerline assets at regular intervals?

- Up to date information is available to the company on the condition of their assets
- To record any faults or defective components
- To detect any corrosion and deterioration of insulators and hardware
- To ensure the condition of the transmission powerline is maintained to a high level

Question 72 Inspect Overhead Structures and Electrical Apparatus

Looking at the images what condition would you rate the tower steel

1.

2.



Question 73 Inspect Overhead Structures and Electrical Apparatus

Looking at the images what condition would you rate the bolts/nuts

1.

2.



Question 74 Inspect Overhead Structures and Electrical Apparatus

Looking at the image what condition would you rate the steel groundwires

3.

4.



Question 75 Inspect Overhead Structures and Electrical Apparatus

Looking at the image what condition would you rate the conductors

1.

2.



Question 76 Inspect Overhead Structures and Electrical Apparatus

Looking at the image what condition would you rate the insulators

1.
2.



Question 77 Definitions

Fill in the definition for the following statements

1. means not connected to any source of electrical supply but not necessarily isolated
2. means directly electrically connected to the general mass of earth so as to ensure and maintain the effective dissipation of electrical energy
3. means having the skills, knowledge and attributes a person needs to complete a task.
4. means not connected to any possible sources of electricity supply by means that will prevent unintentional re-energisation of the electrical apparatus and which is assessed as a suitable step in the process of making safe for access purposes.
5. means clothing, equipment and/or substances which when worn or correctly used, protect parts or all of the body from foreseeable risk of injury or disease at work or in the workplace
6. means the minimum distance in air from exposed conductors that shall be maintained by a person, vehicle or mobile plant (including its load, controlling ropes and any other accessories) when approaching electrical apparatus other than for work in accordance with an access authority
7. means a person with technical knowledge or sufficient experience who has been approved, or has the delegated authority to act on behalf of the organisation, to perform the duty concerned