

# Department of Electrical Engineering

## Assignment

Date: 20/04/2020

### Course Details

Course Title: Electric Power Distribution and Utilization

Module: 4<sup>th</sup>(BTech)

Instructor: Engr. Waleed jan

Total Marks: 30

### Student Details

Name: AZHAD NIAZ

Student ID: 15493

<b>Q1.</b>	<b>(a)</b>	It is often difficult to draw a line between the power transmission and power distribution systems. However, what are the different factors on the basis of which a power distribution system can be differentiated from a power transmission system? Explain briefly.	<b>Marks 05</b>
	<b>(b)</b>	Underground electrical system cannot be used for very large voltages. Justify this statement.	<b>Marks 05</b>
<b>Q2.</b>	<b>(a)</b>	Now-a-days, electrical energy is generated, transmitted and distributed in the form of alternating current. Justify this statement.	<b>Marks 05</b>
	<b>(b)</b>	It is evident from comparison that both overhead and underground system has its own advantages and disadvantages. However, what are the few factors on the basis of which overhead system may be preferred over underground system?	<b>Marks 05</b>
<b>Q3.</b>	<b>(a)</b>	Ring main scheme of connection is more reliable as compared to radial system but is less reliable as compared to interconnected system. Justify this statement.	<b>Marks 05</b>
	<b>(b)</b>	Why is it important requirement of a good distribution system that voltage variations at consumer's terminals should be as low as possible?	<b>Marks 05</b>

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**Q1 (A);** It is often difficult to draw a line between the power transmission and power distribution systems. However, what are the different factors on the basis of which a power distribution system can be differentiated from a power transmission system? Explain briefly.

**ANS; (A)**

First of all we have to clear that power transmission lines have large amount power which cannot be directly delivered to our homes etc. When power is generated in power plant then it is transferred through transmission lines to the sub stations.

There are some points on the basis of which power transmission and distribution are differentiated.

- Transmission lines helps in the movement of electricity from a power plant to the different sub stations, while in distribution carries electricity from substation to consumer's end.
- Transmission carry powers in 3 phase system, while distribution requires single phase supply system fro carry electricity.
- Transmission lines has 11000 volts, while distribution carry very low and safe 220 volts
- Transmission conduct at current 69 kv or more ,while distribution conduct less than 69 kv
- Transmission is thick lines while distribution lines are thin.

**Q1 (b):** Underground electrical system cannot be used for very large voltages. Justify this statement.

**ANS:**

We cannot use very high voltage lines in underground cables because it needs very lot of insulation between them and the ground. Many of cables burn due to overheat.

The weakening of the insulation may lead to the formation of air spaces in the insulation under high voltages the air may be ionized and cause detritions and break down of insulation so we majority of cables have capacity up to 11 kV not high.

The maximum temperature for 11kv is 80C°

**Q2 (A):**

Now-a-days, electrical energy is generated, transmitted and distributed in the form of alternating current. Justify this statement

**ANS: (A)** we know that Alternating current is current that change polarity magnitude and direction and has fixed poles.

Electricity is generated in the form of alternated current and then it is transmitted and distributes in the form of alternating current.

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**ANS2 (A):**

The reason we use alternating is that Ac voltage is easily changed using transformer this is why the electricity transmission lines use very high voltages the electricity produced by the power station is passed through a transformer to raise its voltage to the 100000V . Alternating current is used for electric power distribution because it can easily be transformed to a higher or lower voltage.

**Q2 (B):** It is evident from comparison that both overhead and underground system has its own advantages and disadvantages. However, what are the few factors on the basis of which overhead system may be preferred over underground system?

**ANS2 (B):** There are few factors which over head system is best

- High power transmission can transmit through over head system
- It requires very low insulation
- The faults are easily located in over head system
- It can be used for very long distances
- The maintenance of lines is very easily
- The extension and joining in overhead lines can be easily performed

**Q3 (A):** Ring main scheme of connection is more reliable as compared to radial system but is less reliable as compared to interconnected system. Justify this statement.

**ANS3 (A):**

Ring main system is more reliable than radial because in this system the load consumer is being fed by more than one feeder and in case of one failure of feeder there is an alternative path to supply power to the connected load. While in radial there is no alternative path to supply power to load in case of power interruption

The system is very reliable as each distribution transformer is fed with two feeders that means in the event of fault in any section of the feeder, the continuity of the supply is ensured from the alternative

But interconnected system is more reliable as compared to the radial because it can increase the reliability of supply and during overload hours the area fed from one generating station can be fed from other generating station so it reduce the reserved plant capacity and improves the service reliability and increase the load factor and efficiency of the system,

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**Q3(b):** Why is it important requirement of a good distribution system that voltage variations at consumer's terminals should be as low as possible?

**ANS: Requirements for the good distribution system:**

A considerable amount of effort is necessary to maintain an electric power supply within the requirements of various types of consumers.

Following are requirements of good distribution

1. Proper voltage
2. Availability of power on demand
3. Reliability

**PROPER VOLTAGE:**

- ✓ Permissible limit of voltage variations is  $\pm 6\%$  of the rated value at the consumer's terminals.
- ✓ Low voltage causes inefficient lighting and possible burning out of motors and other electrical appliances.
- ✓ The changes in voltage are generally caused due to the variation of load on the system.
- ✓ Important requirement of a distribution system is that voltage variations at consumer's terminals should be as low as possible.
- ✓ High voltage causes lamps to burn out permanently and may cause failure of other appliances.

**Availability of power on demand:**

- ✓ As electrical energy cannot be stored, therefore, the distribution system must be capable of supplying load demands of the consumers.
- ✓ This necessitates that operating staff must continuously study load patterns to predict in advance those major load changes that follow the known schedules.

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**ANS3 (b):**

- ✓ Power must be available to the consumers in any amount that they may require from time to time.
- ✓ For example, motors may be started or shut down, lights may be turned on or off, without advance warning to the electric supply company.

**Reliability:**

- ✓ This calls for reliable service. Unfortunately, electric power, like everything else that is man-made, can never be absolutely reliable.
- ✓ However, the reliability can be improved to a considerable extent by interconnected system, reliable protection system and providing additional reserve facilities.
- ✓ Modern industry is almost dependent on electric power for its operation. Homes and office buildings are lighted, heated, cooled and ventilated by electric power.