## Quadrant II – Transcript and Related Materials

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| **Programme** | **: Bachelor of Science (First Year)** |
| **Subject** | **: Electronics** |
| **Paper Code** | **: ELG 102** |
| **Paper Title** | **: Repair and Maintenance of Electrical and Electronic Appliances** |
| **Unit** | **: I** |
| **Module Name** | **: IMPORTANCE OF FUSE** |
| **Module No** | **: 03** |
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## Notes:

## Importance of Fuse

- A fuse is needed in any electrical system (AC or DC).
- This protection device reacts to the amount of heat being produced by electricity passing through wires and/or components.
- They are used so as to protect wires and components from the extreme heat produced should there be an electrical overload or short circuit.
- If a short circuit occurs anywhere in the wiring system, an excessive current flow through the wires and through the fuse and if the fuse operates properly, it will melt, cutting off the current before any harm is done.
- If the fuse fails to operate, the wire may become hot enough to ignite the insulation possibly causing fire and it may harm the appliances and fittings connected in the circuit.

- Fuses have a second function, besides protecting in the case of short circuit, they protect in the case of overload.
- If too many appliances are connected in one circuit, more current flows through the supply wires than the wires were meant to carry and will cause the wires to be burnt and appliances, accessories connected in the circuit will be damaged.
- In such case, the fuse, if selected, will melt or blow, thus protecting the wires, appliances, accessories, etc.

**What is the possible accident without a fuse?**

- However, if you built the wiring system without a fuse (that is, you simply bypass them and keep a continuous line), nothing happens until the first short circuit. If this happens, then the wire will have to be a fuse- it will heat, melt and break.
- Without a fuse, there are many possibilities for electrical fires or extreme damage to a circuit.
- The fuse wire is always connected in the live wire of the circuit because if the fuse is put in the neutral wire, then due to excessive flow of current when the fuse burns, current stops flowing in the circuit, but the appliance remains connected to the high potential point of the supply through the live wire.

**Type of material used in fuse**

- Generally, an alloy of tin and lead is used as the material of the fuse wire as it has high resistivity and low melting point.
- Usually, the fuse wire is a thin wire, the resistance of the fuse wire is much more than that of the live wire**.**

**Characteristics of a good fuse wire**

- It should have low melting point.

- It should have low ohmic losses.
- It should have high resistivity.
- It should be economical.
- It should be free from detraction**.**

**Types of Fuses**

❑ **Depending upon the type of input voltage**

1. **DC fuses**

- In a DC system, when the metallic wire melts because of the heat generated by the overcurrent, then the arc is produced and it is very difficult to extinct this arc, because of DC constant value.
- So, in order to minimize the fuse arcing, DC fuse is a little bigger than AC fuse which increases the distance between the electrodes to reduce the arc in the fuse.

2. **AC Fuses**

- Voltage with 60Hz or 50Hz frequency changes its amplitude from zero to 60 times every second, so arc can be extinct easily as compared to DC.
- Therefore, AC fuses are a little bit smaller in size as compared to DC fuses.

❑ **Depending upon one time or multiple uses**

1. **One-time use fuses**

- Contains a metallic wire which burns out when an overcurrent , overload or mismatched load current event occurs.
- User has to manually replace these fuses.
  - Types of one-time use fuses

a. **Cartridge fuses**:

- General purpose fuse with no time delay
- Heavy duty cartridge fuses with time delay

b. **Blade type fuses**

c. **SMD, Axial fuses, Thermal fuses, High Rupturing capacity fuses & high voltage fuses**.

2. **Resettable fuse**

- Device which can be used multiple times without replacing it.
- They open the circuit when an overcurrent event occurs and after some specific time, they connect the circuit again.
- Such fuses are used where manually replacing fuses is difficult or almost impossible.

Eg. Fuse in Nuclear or Aerospace systems.