# Low Voltage Hazards

- Low voltage = Higher than 50V ac, 120Vdc
  Lower than High Voltage

- **Voltage hazards can be reduced by proper system grounding**

- **Step voltage, Touch voltage, Mesh voltage, Transferred voltage**

# The nature of hazard

- The relationship of frequency to hazard---
- **Up to 100 HZ--- Similar effect for AC & DC**
- **Above 100 KHZ------- 10 to 100 mA Threshold**

# Capacitor discharge

- 1 micro Farad, 10 KV—Ventricular fibrillation
- Specific hazard of electronics equipments
- Electric shock from 120 to 240, 480V supply.
- Radio frequency
- Induced voltage
- Non ionizing RF radiation hazard
- Electrical Hazard
- Chemical Hazard
- Explosion Hazard

# Medium and high voltage safety

- Open circuit in secondary of current transformers causes high voltage
- System grounding --- The connection of one of the conductors to earth.

**Reduce the risk to electrocution---**

- **Protective equipments must be used.**
- **Hard hat, Eye protection, Electric arc protection, Rubber glove, Rubber insulated equipments, Voltage testing equipments.**

# SAFETY PROCEDURES

- Approach distance must be regarded
- Qualified person to perform the task
- Complete risk analysis
- Review and approve the plan and analysis
- Documentation & approval procedure
- Working by minimizing the risk
- PPE– Personal Protection Equipments must be used.

# SAFETY PROCEDURES & METHODS

- Think , be aware
- Understand your procedure
- Follow your procedure
- Use appropriate safety equipments
- Ask if you are unsure. Do not assume
- Do not answer, if you do not really know.

# The steps required before de-energizing

- All energy control devices feeding the area must be opened
- Lock and tags placed on energy control devices
- Voltage measurement
- Safety grounding
- Qualified inspector inspects the work area
- Test the instruments
- Measure the equipments being verified
- Re-test the instruments.

# ONE MINUTE SAFETY AUDIT

- Notify the responsible persons of your presence in area
- Listen to any abnormal sounds
- Sniff for unusual odours
- Locate all fire emergency exits
- Locate all fire alarms and telephones
- Inspect all transformer insulation liquid levels, temperature and pressure
- Locate station one line diagram
- Make certain room is neat and tidy

# ONE MINUTE SAFETY AUDIT

- **Be certain that all required equipments are readily available and easily reached**
- **Check to see that all protective relays and other operational flags are properly reset**

## ELECTRICAL INSTALLATION SAFETY

- **Proper design**
- **Selection**
- **Installation**
- **Calibration**

# ENGINEERING

- Property testing
- Physical setting of devices
- To certain that the equipment is capable of performing when called upon.

# HUMAN FACTORS IN ELECTRICAL SAFETY

- Sense physical stimuli
- Perceive and process information
- Act

# SLOW REACTION

- Sleep deprivation
- Fatigue
- Time of delay
- Environmental extreme
- Alcohol
- Drug use
- Medical problem
- Nutrition

(5) INSTALLATION SAFETY

SLIDE 3 → 5

Q19 → Q20

(6) WORKING NEAR EXPOSED MAIN

SLIDE 1 → 3

Q21 → Q22

PERFORM THE ASSIGNMENT EXERCISE OUTLINED IN STUDY GUIDE

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PART(1) + PART(2)

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- STUDY PACKAGE(1) SAFETY & INSTALLATION PROCEDURE
- STUDY PACKAGE(2) PLANNING - REGULATORY REQUIREMENTS

PART(3) - RISK MANAGEMENT STRATEGIES

PART(4) EVALUATE RISK MANAGEMENT STRATEGIES

E017

PART(1)

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STUDY PACKAGE(1) SAFETY & INSTALLATION PROCEDURE

ESI SAFETY PART 1 → 5

DO EXERCISES

PART(2)

PERFORM EXERCISE(2)

PART(3)

PERFORM EXERCISE(3)