ASSIGNMENT No: 3

1. What are the important features of Electrification of a high rise apartment building?

Soln:- # High rise residential apartments are those buildings having a height above ground level of more than 15m.

* Lift machine rooms or the water tanks will not be taken into account in fixing the height of the building
* These building come under the section 54 of the Electricity Act 2003 and rule 50(A) of the Indian Electricity Rules 1956.
* The electric power supply arrangement in the high rise apartment buildings are normally provided through a transformer sub station which recieves power at 11kV on the high voltage side.
* Load Calculation: must be done to determine the electrical demand of the building. The building's electrical infrastructure must have sufficient capacity to meet the demands of all the residents electrical needs.
* Electrical safety: Safety features such as circuit breakers ground fault interrupts and surge protectors must be installed to prevent electrical accidents and damage to electrical equipment

* Efficient electrical distribution : The electrical system should be designed to minimize energy loss and ensure that power is distributed evenly throughout the building.

* Backup power supply : A backup power supply such as a generator or battery backup system should be installed to ensure that critical systems such as elevators and emergency lighting remain operational during power outages.

* Energy efficiency : The building's electrical system should be designed to be as energy efficient as possible through the use of energy effecient lighting, appliences and HVAC systems.

* Smart technology :- The use of smart technology such as smard meters and automated lighting controls can help to optimize energy usage and reduce energy costs.

2. Explain briefly the precommisioning tests for a domestic wiring installation.

Ans:- 1. Insulation Resistance test

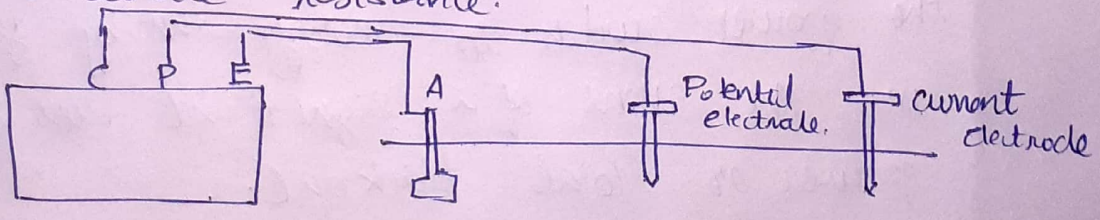
* Its objective is to measure the ohmic value of the insulation under a direct voltage of great stability, generally 50, 100, 250, 500 or 1000 VDC.

* A megohmmeter is then used to measure the ohmic value of an insulator under a DC voltage of great stability.

* The insulation resistance in mega ohms measured as above shall not be less than 12.5 m ohms for the wiring with PVC insulated cables, subject to minimum of 1 MΩ.

2. Polarity Test of switch :- This test will verify that all the switch installed in the system are connected in current carrying conductor and not in neutral.
   * The terminals of all switches shall be tested by a test lamp, one lead of which is connected to the earth.
   * Glowing of test lamp to its full brightness, when the switch in "ON" position shall indicate that the switch is connected to the right polarity.

3. Earth Electrode Resistence Test : The purpose of this test is to establish that the resistence of the soil is suitable and that the electrode makes contact with soil.
   * Two auxillary earth electrode, besides the test electrode are placed at suitable distance from the test electrode.
   * A measured current is passed b/w the electrode A. to be tested and an auxillary electrode 'C' and the potential difference b/w the electrode 'A' and auxillary potential 'B' is measured.
   * Measured Voltage current values are used to calculate the electrode resistence.



4. Earth Continuity Test:- The purpose of this test is to check that there is a good connection b/w the earth pin on the plug and the case of the appliance.

* A good connection is defined as having a resistance less than 0.1 ohms.
* If the resistance measured is less than 0.1, then appliance is safe.
* The conventional way to carry out this test is to plug the appliance into a Portable Appliance Tester and clip the test lead to a suitable earth point.

Other than these tests, following things are also done:-

i) Analysis of the wiring diagrams to confirm the polarity of connections.

ii) A general inspection of the equipment, physically verifying all the conditions.

iii) Checking the operation of the protection tripping and alarm circuits.

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3. What is the function of Automatic Mains Failure:-

Soln:- An uninterrupted power supply (UPS) system is the bridge b/w mains power and the back up generators. Automatic Mains Failure (AMF) panels also reffered to as Automatic Transfer Switch (ATS) panels.- make the power switch to emergency standby generators in the event of a significant loss of mains power or total blackout.

There are three main types of AMF units :-

i) Using Microcontroller in the unit itself.

ii) Using PLC for control action. [Programmable Logic Control].

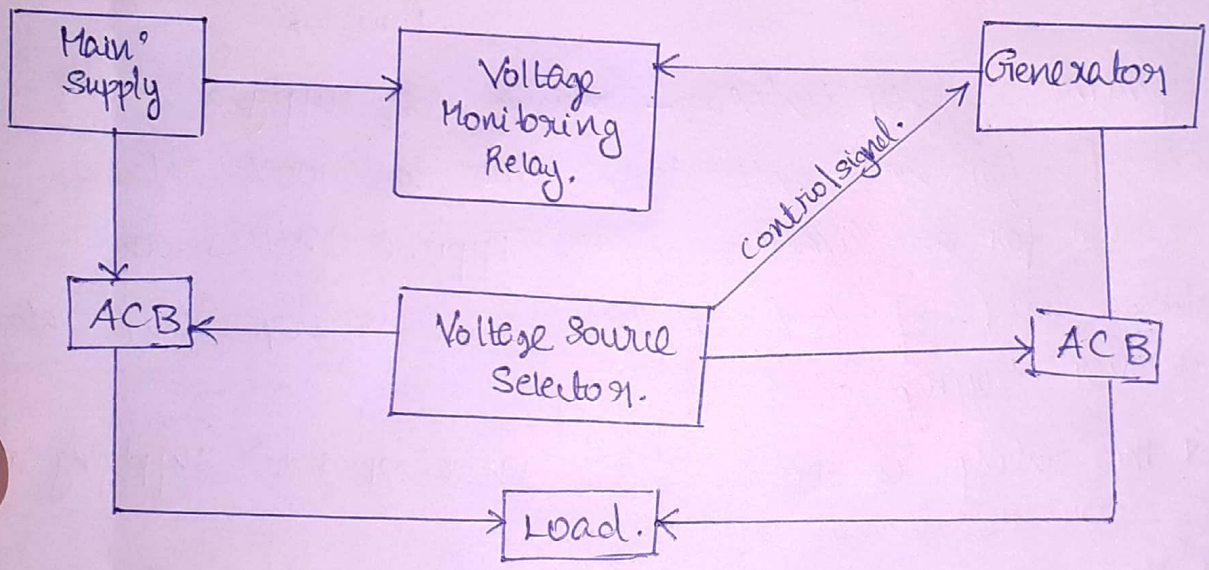
iii) With the help of Relay Mechanism.

AMF based on Relay Mechanism

Components.

Voltage Monitoring Relay [Phase Failure Detector]

Overload Relay and Aircircuit Breaker [ACB].



* Power from mains supply is continuously monitored by PFD, with the help of relay unit.
* It gives signal to the ACB for its operation / protection.
* When PFD detects fault in the mainsupply, it disconnects the mainsupply from the load by tripping the ACB.
* Generator will start automatically.
* When the generator runs at rated speed & frequency then the ACB will operate & supply is given to the generator.

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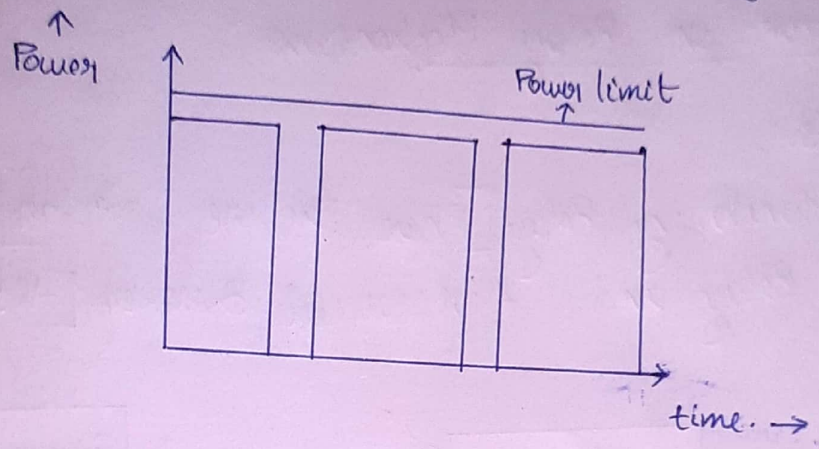
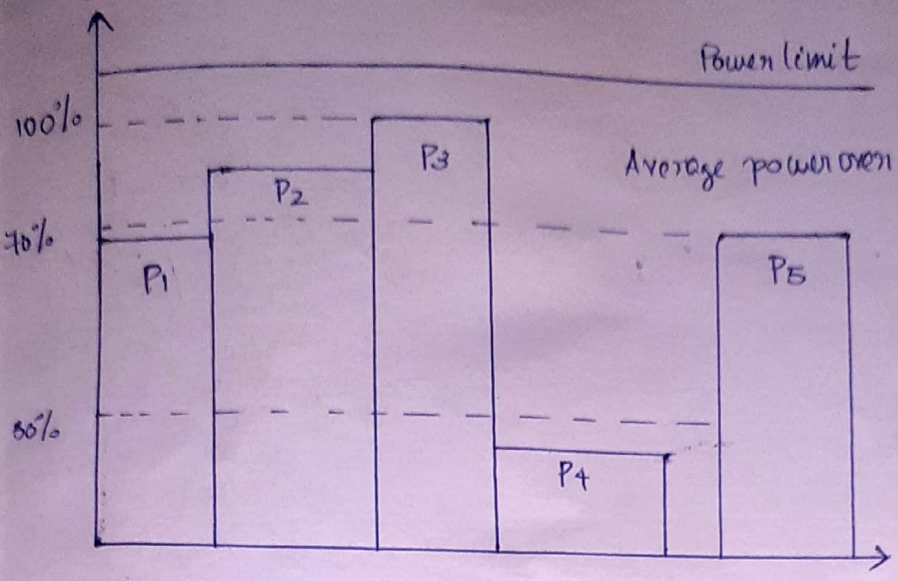
4. With respect to the rating of standby generator sets, explain

i.) Continuous power rating :- engine can supply rated power for an unlimited ~~type~~ time.



ii) prime power rating :- Engine can supply a base load for an unlimited time, and 100% rated power for a limited time. Typical values are base load of 70% of the rated power, 100% rated power during 500 per year.

* This rating is applicable to generator sets supplying a variable power sequence.
* The sequence may be run for an unlimited numeer of hours per year between the stated maintenance intervals.
* prime power is the maximum power generated during the sequence and the average power overg any 24 hour period is not to exceed a stated percentage of the prime power.
* The prime power is available for peak loads which occur after start ; such as motor starting and UPS battery charging. And after these loads are induced, the steady state loads remains as it is



Prime power rating.

iii) Standby power rating :- Maximum power that the engine can deliver and is limited in time, less than 500 hrs per year.

→ Standby power rated generators are the most commonly rated generator sets.

→ Their application is to supply emergency power for a limited duration during a power outage.

→ Applied to generator sets which are used exclusively for emergency power.

Typical example of a diesel engine set is as follows

* Continuous power rating of 15.5 kW
* prime power rating of 17.6 kW
* Standby power rating of 18.8 kW