SNS COLLEGE OF ENGINEERING

Kurumbapalayam (Po), Coimbatore – 641 107

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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

COURSE NAME : 19EE605 PROTECTION AND SWITCHGEAR

III YEAR /VI SEMESTER

Unit 1- PROTECTION SCHEMES

Topic: Nature and Causes of Faults

NATURE AND CAUSES OF FAULTS

- Faults are caused either by insulation failures or by conducting path failures.
- The failure of insulation results in short circuits which are very harmful as they may damage some equipment of the power system.
- Most of the faults on transmission and distribution lines are caused by over voltages due to lightning or switching surges, or by external conducting objects falling on overhead lines.
- Over voltages due to lighting or switching surges cause flashover on the surface of insulators resulting in short circuits.
- Sometimes, insulators get punctured or break.

NATURE AND CAUSES OF FAULTS

- Sometimes, certain foreign particles, such as fine cement dust or soot in industrial areas or salt in coastal areas or any dirt in general accumulates on the surface of string and pin insulators.
- This reduces their insulation strength and causes flashovers. Short circuits are also caused by tree branches or other conducting objects falling on the overhead lines.
- Birds also may cause faults on overhead lines if their bodies touch one of the phases and the earth wire (or the metallic supporting structure which is at earth potential).
- If the conductors are broken, there is a failure of the conducting path and the conductor becomes open-circuited.

NATURE AND CAUSES OF FAULTS

- If the broken conductor falls to the ground, it results in a short circuit. Joint failures on cables or overhead lines are also a cause of failure of the conducting path.
- The opening of one or two of the three phases makes the system unbalanced.
- Unbalanced currents flowing in rotating machines set up harmonics, thereby heating the machines in short periods of time.
- Therefore, unbalancing of the lines is not allowed in the normal operation of a power system.
- Other causes of faults on overhead lines are: direct lightning strokes, aircraft, snakes, ice and snow loading, abnormal loading, storms, earthquakes, creepers, etc.
- In the case of cables, transformers, generators and other equipment, the causes of faults are: failure of the solid insulation due to aging, heat, moisture or overvoltage, mechanical damage, accidental contact with earth or earthed screens, flashover due to over voltages, etc.

NATURE AND CAUSES OF FAULTS

- Sometimes, circuit breakers may trip due to errors in the switching operation, testing or maintenance work, wrong connections, defects in protective devices, etc.
- Certain faults occur due to the poor quality of system components or because of a faulty system design.
- Hence, the occurrence of such faults can be reduced by improving the system design, by using components and materials of good quality and by better operation and maintenance.

Assessment

1. What will happen to a bird sitting on a high power line?

   a) Will feel electric shock

   b) Not get electric shock.

   c) Will die due to HV

References

1. SuniS Rao, “Switchgear, Protection and Power System (Theory, Practice & Solved Problems)”, Khanna Publishers, New Delhi, 2019.

2. Paithankar Y G, Bhide S R, “Fundamentals of Power System Protection”, Prentice Hall of India Pvt Ltd., New Delhi, 2nd Edition, 2014.

3. Badriram, Vishwakarma B.H, “Power System Protection and Switchgear”, New Age International Pvt Ltd Publishers, 2nd Edition 2017.

Thank You