



SNS COLLEGE OF ENGINEERING

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AN AUTONOMOUS INSTITUTION

Approved by AICTE, New Delhi and Affiliated to Anna University, Chennai

VI Semester

B.E-Electrical & Electronics Engineering

19EE605 – PROTECTION AND SWITCHGEAR



SHORT QUESTIONS AND ANSWERS

UNIT I INTRODUCTION

1. What are the functions of protective relays

To detect the fault and initiate the operation of the circuit breaker to isolate the defective element from the rest of the system, thereby protecting the system from damages consequent to the fault.

2. Give the consequences of short circuit.

Whenever a short-circuit occurs, the current flowing through the coil increases to an enormous value. If protective relays are present, a heavy current also flows through the relay coil, causing it to operate by closing its contacts. The trip circuit is then closed, the circuit breaker opens and the fault is isolated from the rest of the system. Also, a low voltage may be created which may damage systems connected to the supply.

3. Define protected zone.

Are those which are directly protected by a protective system such as relays, fuses or switchgears? If a fault occurring in a zone can be immediately detected and or isolated by a protection scheme dedicated to that particular zone.

4. What are unit system and non unit system?

A unit protective system is one in which only faults occurring within its protected zone are isolated. Faults occurring elsewhere in the system have no influence on the operation of a unit system. A non unit system is a protective system which is activated even when the faults are external to its protected zone.

5. What is primary protection?

Is the protection in which the fault occurring in a line will be cleared by its own relay and circuit breaker. It serves as the first line of defence.

6. What is back up protection?

Is the second line of defence , which operates if the primary protection fails to activate within a definite time delay.

7. Name the different kinds of over current relays.

Induction type non-directional over current relay, Induction type directional over current relay & current differential relay.

8. Define energizing quantity.

It refers to the current or voltage which is used to activate the relay into operation.

9. Define operating time of a relay.

It is defined as the time period extending from the occurrence of the fault through the relay detecting the fault to the operation of the relay.

10. Define resetting time of a relay.

It is defined as the time taken by the relay from the instant of isolating the fault to the moment when the fault is removed and the relay can be reset.

11. What are over and under current relays?

Over current relays are those that operate when the current in a line exceeds a predetermined value. (eg: Induction type non-directional/directional over current relay, differential over current relay)whereas undercurrent relays are those which operate whenever the current in a circuit/line drops below a predetermined value.(eg: differential over-voltage relay)

12. Mention any two applications of differential relay.

Protection of generator & generator transformer unit; protection of large motors and bus bars .

13. What is biased differential bus zone reduction?

The biased beam relay is designed to respond to the differential current in terms of its fractional relation to the current flowing through the protected zone. It is essentially an over-current balanced beam relay type with an additional restraining coil. The restraining coil produces a bias force in the opposite direction to the operating force.

16 Marks Questions

1. (a) What are the causes of over voltage on a power system? (8)
(b) Why is it necessary to protect the lines and other equipment of the power system against over voltages? (8)
2. Describe the phenomenon of lightning. (16)
3. What protective measures are taken against lightning over voltages? (16)
4. (a) What is tower-footing resistance? (4)
(b) Why is it required to have this resistance as low as economically possible? (4)
(c) What are the methods to reduce this resistance? (8)
5. (a) What is necessity of protecting electrical equipment against traveling waves? (6)
(b) Describe in brief the protective devices used for protection of equipment against such waves? (10)
6. Describe the protection of stations and sub-stations against direct lightning stroke. (16)
7. Describe the construction and principle of operation of
 - (i) expulsion type lightning arrester, (8)
 - (ii) Valve type lightning arrester. (8)
8. What is Peterson coil? What protective functions are performed by this device? (16)
9. Write short notes on the following.

- (i) klydonograph and magnetic link (4)
- (ii) Rod gap (4)
- (iii) Arcing horns (4)
- (iv) Basic impulse insulation level (4)

10. What are the requirements of a ground wire for protecting power conductors against direct lightning stroke? Explain how they are achieved in practice. (16)

11. Determine the inductance of Peterson coil to be connected between the neutral and ground to neutralize the charging current of overhead line having the line to ground capacitive of $0.15\mu\text{f}$. If the supply frequency is 50Hz and the operating voltage is 132 KV, find the KVA rating of the coil.

12. (a) Explain the term insulation coordination. (8)

(b) Describe the construction of volt-time curve and the terminology associated with impulse-testing.

13. Explain the operation of various types of surge absorbers (16)