[06 – 4122]

IV/IV B.E. DEGREE EXAMINATION.

First Semester

Electrical and Electronics Engineering

POWER SYSTEM PROTECTIONS

(Effective from the admitted batch of 2006–2007)

Time : Three hours Maximum : 70 marks

First question is compulsory.

Answer any FOUR from the remaining.

All questions carry equal marks.

1. (a) Explain what is meant by cut-off, pre-arcing time and arcing time of a HRC fuse.

(b) Distinguish between restricting and recovery voltages.

(c) Compare the features of a minimum oil CB with that of a bulk oil CB.

(d) State the basic components of static relays.

(e) Draw the protection scheme for bus bars.

(f) Explain briefly insulation co-ordination.

8. (a) Give the general layout of a substation and explain.

(b) Compare the relative performances of expulsion gap, rod gap and valve type lighting arresters.

(c) What is a travelling wave? Explain the development of such a wave on an overhead line.

(g) (i) What is the meaning of restricted earth fault protection?

(ii) Distinguish between over current, directional and differential relays.

2. (a) With the help of a neat diagram, explain the operation of a HRC fuse.

(b) Discuss the process of arc extinction in power circuit breakers. Compare the merits and demerits of arc quenching media used in circuit breakers.

3. (a) Derive an expression for the value of restricting voltage in a circuit breaker and show that the rate of rise restricting voltage is proportional to the natural frequency of the circuit.

(b) How does SF_6 breakers differ from air blast circuit breakers?

(c) Name the possible application of vacuum circuit breakers.

4. (a) Give the properties of SF_6 gas and explain the arc extinction process in SF_6 gas.

(b) A 3-phase OCB is rated at 1200 Amps, 1500 MVA, 33 KV, 3 sec. What are its ratings?

(c) Why is SF_6 preferred over air as a gas medium in circuit breakers?

5. (a) With the help of circuit diagram, discuss the protection parallel feeders.

(b) Explain the terms in the context of a relay :

(i) Reset value

(ii) Characteristic of a relay and

(iii) Pick up value.

(c) Explain, what is meant by distance protection? Illustrate with the help of R-X diagrams, the difference between impedance, resistance and MHO type relays.

6. (a) Draw the generalised block diagram of a static relay and explain its operation.

(b) What is meant by directional feature of a directional over current relay? Describe the construction and principle of operation of a directional over current relay.

7. (a) Describe any one type of surge diverters with the help of neat diagram and explain its operation.

(b) What do you understand by volt-time curve of an insulating medium? What is its application?

(c) A 33 Kv, 3-phase, 50 Hz, overhead transmission line has capacitance to earth of 0.5 μF. Determine the inductance and KVA rating of the Peterson coil.