

III B.Tech. II Semester Regular Examinations, April/May -2005**POWER SYSTEMS-III****(Electrical & Electronic Engineering)****Time: 3 hours****Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

1. A rectangular surge voltage E travels along a conductor of surge impedance Z_c towards a transition point P . Show that the voltage V_0 and current i_0 at point P satisfy the relation $V_0 = 2E Z_e i_0$.
2. Explain the following :-
 - (a) Resistance grounding
 - (b) Reactance grounding
3. (a) What are the different types of circuit breakers when the arc-quenching medium is the criterion? Mention the voltage for which a particular range of circuit breaker is recommended.
(b) Discuss the recovery rate theory and energy balance theory of arc interruption in a circuit breaker.
4. Explain direct testing of circuit breakers with a neat diagram
5. (a) Explain the process of fault clearing with the help of a neat sketch.
(b) Classify the various types of over current relays and give their application along with approximate characteristics.
6. (a) Where are the relays having extremely inverse and very inverse characteristics used? What types of characteristics are used for protecting rectifiers ,and for replacement of fuses?
(b) Explain how the mho characteristic realized using a sampling comparator?
7. (a) Define 'differential protection' Describe the principle of circulating current differential protecting
(b) State the various applications of differential protection.
8. (a) Explain how the selection of current and time settings is done in a time current graded system.
(b) Give schemes of protection for a parallel feeder fed from
 - i. one end
 - ii. both the ends.

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POWER SYSTEMS-III

(Electrical & Electronic Engineering)

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1. A 200Kv surge travels on a transmission line of 400 ohms surge impedance and reaches a junction where two branch lines of surge impedances of 500 ohms and 300 ohms are connected with the transmission line. Find the surge voltage and current transmitted in to each branch line. Also find the reflected voltage and current.
2. (a) How do earthing screen and ground wires provide protection against direct lightning strokes?
(b) Explain why the surge diverters are located very close to the equipments to be protected and mention the application of surge absorbers .
3. Explain the reason for initiation of electric arc during contact separation. Also discuss which of these is primarily responsible for creation of arc in circuit breakers and why?
4. Explain direct testing of circuit breakers with a neat diagram
5. (a) Discuss the effect of power surges on the performance of different types of distance relays.
(b) Discuss in detail the applications of over current relays.
6. (a) Explain the merits and demerits of static relays.
(b) Discuss how an amplitude comparator can be converted into a phase comparator and vice versa.
7. (a) Discuss the protection employed against loss of excitation of alternator.
(b) Discuss any one of the stator protection schemes for generators above 1MW.
8. Write short notes on
 - (a) Reactance relay
 - (b) Mho relay
 - (c) Directional Impedance relay.

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1. Discuss the behaviour of traveling wave when it reaches the end of
 - (a) open circuited
 - (b) short circuited transmission line. Draw diagrams to show voltage and current on the line before and after the wave reaches the end.
2. Describe the construction and working principle of a zinc oxide gapless arrester with a neat sketch .
3. (a) Explain the following.
 - i. Classification of restriking transients
 - ii. Restriking voltage characteristics(b) Explain with a neat diagram the factors affecting the restriking voltage characteristics.
4. Explain direct testing of circuit breakers with a neat diagram
5. (a) Discuss the principle of operation of an Induction disc relay with relevant diagrams.
 - (b) What are the advantages of Induction cup relays over Induction disc relays. What is the purpose of shading in an Induction disc relay?
6. (a) Explain the merits and demerits of static relays.
 - (b) Discuss how an amplitude comparator can be converted into a phase comparator and vice versa.
7. With the help of neat sketches explain the protections of a star – delta power transformer, against the following abnormal conditions
 - (a) phase to phase fault
 - (b) earth fault
 - (c) high voltage surges
8. (a) Describe the principle of impedance type distance relay and explain its characteristics on V-I And R-X planes.
 - (b) Derive expression for torque developed by a double activating quantity distance relay. Show that the relay operates when fault is within the protected distance of line.

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1. Draw equivalent circuit for finding the transmitted voltage and current surges on a forked line. Derive expressions for the transmitted voltage and currents.
2. (a) Explain the statement in ungrounded system “ Healthy line voltage increases by $\sqrt{3}$ times during an earth fault on the third line ”.
(b) Discuss the merits of
 - i. Solid grounding
 - ii. Resistance grounding.
3. For a 32kV System reactance and capacitance up to the location of the circuit breaker is 3 ohms and 0.015microfarad, respectively. Calculate the following
 - (a) The frequency of transients oscillation
 - (b) The maximum value of restriking voltage across the contacts of the circuit breaker
 - (c) The maximums value of RRRV
4. Explain direct testing of circuit breakers with a neat diagram
5. (a) What protective devices other than the differential protection are used for the protection of a large transformer? Briefly describe them.
(b) Show that the torque on the disc of an induction disc relay is maximum when the phase difference between the two fluxes is 90 Degrees.
6. (a) Explain the merits and demerits of static relays.
(b) Discuss how an amplitude comparator can be converted into a phase comparator and vice versa.
7. Show in detail, the protection arrangement of a 60 MW generator provided with
 - (a) Differential protection
 - (b) Back-up over – current protection through faults
 - (c) standby earth fault protection in neutral connection.
8. (a) Explain how the selection of current and time settings is done in a time current graded system.
(b) Give schemes of protection for a parallel feeder fed from

- i. one end
- ii. both the ends.
