

Code :R7320205

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III B.Tech II Semester(R07) Regular & Supplementary Examinations, April/May 2011

SWITCH GEAR & PROTECTION

(Electrical & Electronics Engineering)

Time: 3 hours

Max Marks: 80

Answer any FIVE questions
All questions carry equal marks

1. What are the two theories explaining Current zero interruption? Explain in detail.
2. (a) Explain the performance of Minimum oil circuit breaker.
(b) Describe the principle of operation of SF₆ circuit breaker.
3. Describe the construction, principle of operation and application of an Induction disc type of relay.
4. Explain with a diagram, the Merz-Price circulating current system to the protection of alternators. What precautions must be taken in installing this system?
5. What is Buchholz relay? Discuss its working principle? For what types of faults is it employed.
6. (a) Explain bus bar protection need special attention. Why?
(b) What is back up protection of bus bars?
7. (a) Explain the phenomenon of arcing ground.
(b) Suggest some methods to minimize the effect of this phenomenon with neat sketch.
8. (a) How over head transmission lines are protected from lightning strokes.
(b) Why ground wire is provided as the top lost conductor in high voltage transmission lines.

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1. (a) What are the two theories explaining Current zero interruption? Explain any one theory in detail.
(b) In a system of 132kV, the line to ground capacitance is $0.01\mu\text{F}$ and the line inductance is 5H. Determine the voltage appearing across the pole of a circuit Breaker. If a magnetizing current of 5 amps (instantaneous value) is interrupted. Determine also the value of resistance to be used across the contacts to eliminate the Restriking voltage
2. Describe the construction, principle of operation and application of SF_6 circuit breakers. Explain clearly the current chopping process in SF_6 circuit breakers
3. (a) Explain the merits and demerits of Static relays.
(b) Discuss the principle of operation of an Induction disc relay with relevant diagrams.
4. (a) Enumerate the relaying schemes, which are employed for the protection of a modern alternator.
(b) An 11kV, 100MVA generator is provided with differential scheme of protection. The percentage of the generator winding to be protected against phase to ground fault is 80%. The relay is set to be operate when there is 15% out of balance current. Determine the value of resistance to be placed in the neutral to ground connection.
5. Describe with a neat sketch, the operation of Buchholtz relay.
6. (a) Explain over-current protection of feeders.
(b) How is the protection system graded with respect to the time of operation of relays.
7. (a) Discuss ungrounded system and resonant grounded system.
(b) Write short notes on Protection against arcing grounds.
8. (a) What are volt time curves?
(b) What is their significance in power system studies?

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1. In a 132kV system, the reactance and capacitance up to the location of circuit breaker is 3ohms and 0.015 μ F respectively. calculate the following:
 - (a) The frequency of transient oscillation
 - (b) The maximum value of Restriking voltage across the contacts of circuit breaker
 - (c) The maximum value of RRRV
2. (a) What are the important components common to most of circuit breakers? Discuss each component briefly.
(b) What are the merits and demerits of typical Minimum oil circuit breakers?
3. (a) Explain the application of Differential relays and Percentage differential relays.
(b) What are the advantages of Induction cup relays over Induction disc relays? What is purpose of shading in an Induction disc relay?
4. Explain with neat diagram the Merz-Price protection for generator.
5. What is Buchholtz relay? Which equipment is protected by it? For what types of faults is it employed? Discuss its working principle.
6. (a) Explain Translay scheme.
(b) Explain three zone protection of bus bars.
7. (a) What are the reasons leading to the general practice of earthing the neutral point of a power system? Explain.
(b) Explain the phenomenon of arcing grounds and discuss the method to minimize the effect of this phenomenon.
8. (a) Explain clearly why lightning arresters are used.
(b) Explain about lightning absorbers and diverters.

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1. Write a short notes on the rate of restriking voltage and explain its importance in Arc extinction.
2. What is a Minimum oil circuit breaker? What are its main advantages and disadvantages? Draw a diagram illustrating the construction of this circuit breaker.
3. Describe the construction of attracted armature type relay. Why can they operate in a.c and d.c? State its salient features.
4. (a) Discuss the protection employed against loss of excitation of alternator.
(b) Discuss any one of the Stator protection schemes for generators above 1MW.
5. What is Buchholz relay? Discuss its working principle? For what types of faults is it employed.
6. With a neat sketch discuss the differential scheme for bus zone protection.
7. (a) Describe the various methods of grounding.
(b) A 132kV, 3 phase, 50Hz overhead line of 100 km length has a capacitance to earth of each line of $0.01 \mu\text{F}$ per km. Determine inductance and kVA rating of the arc suppression suitable for this line.
8. (a) How over head transmission lines are protected from lightning strokes.
(b) Why ground wire is provided as the top lost conductor in high voltage transmission lines.
