

Code No: 07A60202

R07**Set No. 2**

III B.Tech II Semester Examinations, December 2010

SWITCHGEAR AND PROTECTION

Electrical And Electronics Engineering

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

1. What protective device other than the differential protection are used for the protection of a large transformer? Briefly describe them. [16]
2. Discuss the various types of Stator and Rotor faults generally encountered in Generators and mention the protection schemes employed. [16]
3. With a neat sketch discuss the differential scheme for bus zone protection. [16]
4. (a) Explain the ratings of a Circuit breaker.
(b) An air-blast circuit breaker designed to interrupt a transformer magnetizing current of 15A(rms) chops the current at an instantaneous value of 12A. The value of L and C in the circuit are 8H and $0.009\mu\text{F}$. Find the voltage that appears across the circuit breaker. Assume that the inductive energy is transformed to capacitance. [8+8]
5. (a) Describe the behavior of electric arc in high Vacuum.
(b) Discuss the arc phenomena in a circuit breaker? On what factors does the arc phenomena depend? [8+8]
6. (a) Explain the phenomenon of Arcing grounds and suggest the method to minimize the effect of this phenomenon.
(b) Explain the different types of neutral groundings. [10+6]
7. (a) Explain the following terms with respect to switch gear protection
 - i. Pick up level
 - ii. operating time
 - iii. Reach
 - iv. Under Reach
 - v. Over Reach.
 (b) An earth fault setting relay has a setting of 20%, current rating 5A, it is connected to a C.T of ratio 500:5. Calculate pick up current in primary for which the earth fault relay operates. [8+8]
8. (a) What are the basic requirements of a lightning arrester? Differentiate between
 - i. A lightning arrester and a lightning conductor
 - ii. Surge diverter and surge absorber.

Code No: 07A60202

R07

Set No. 2

- (b) What are the causes of over voltages arising on a power system? Why is it necessary to protect the lines and other equipment of the power system against over voltages? [8+8]

FIRSTRANKER

Code No: 07A60202

R07**Set No. 4**

III B.Tech II Semester Examinations, December 2010

SWITCHGEAR AND PROTECTION

Electrical And Electronics Engineering

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

1. Discuss the unbalanced loading and overload protection in alternators. 'Overload protection is not necessary for alternators' ? Justify yourself? [16]
2. In a 132kV system, the inductance and capacitance up to the location of circuit breaker are 0.4H and 0.015 μ F, respectively. Determine
 - (a) the maximum value of the restriking voltage across the contacts of circuit breaker,
 - (b) frequency of transient oscillation and the maximum value of RRRV. [8+8]
3. Explain the principle of arc extinction and What are the different methods of arc extinction. [16]
4. (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. [6+10]
5. Write short notes on the following:
 - (a) Different transformer faults
 - (b) Biased differential protection for transformer
 - (c) Buchholtz Relay. [6+6+4]
6. (a) Explain the phenomenon of arcing grounds. How does neutral grounding eliminates arcing grounds.
(b) In a 50 Hz other head line the capacitance of one line to earth was 1.5 μ F. It was decided to use on earth fault neutralizer. Calculate the reactance neutralize the capacitance of
 - i. 100% of the length of line
 - ii. 90% of the length of line
 - iii. 85% of the length of line. [8+8]
7. Show that the torque on the disc of an induction disc relay is maximum when the phase difference between the two fluxes is 90° . Indicate the direction of rotation of the disc with reference to the fluxes under the poles. [16]
8. (a) What are the requirements of protection of lines?
(b) Write short notes on the following: [10+6]

Code No: 07A60202

R07

Set No. 4

- i. Fault bus protection
- ii. Translay scheme.

FIRSTRANKER

Code No: 07A60202

R07**Set No. 1****III B.Tech II Semester Examinations, December 2010****SWITCHGEAR AND PROTECTION****Electrical And Electronics Engineering****Time: 3 hours****Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

1. (a) How are the traveling waves produced in transmission lines.
 (b) Explain earth wire protection scheme of transmission lines. [8+8]
2. What is Buchholz relay? Discuss its working principle? For what types of faults is it employed? [16]
3. (a) How earth fault protection is achieved in case of the feeders.
 (b) Explain any one protection scheme for the protection of parallel feeders. [8+8]
4. Discuss the merits and demerits of earthing it solidly, through a resistance and through reactance. [16]
5. Discuss the precautions to be taken to avoid dust, moisture, leakage in case of SF₆ circuit breakers. And explain the arc quenching process in SF₆ circuit breakers. [16]
6. Explain the principle of operation of
 (a) Watt hour-meter type relay
 (b) Induction cup type relays. [8+8]
7. Discuss the problems associated with the interruption of
 (a) Low Inductive currents
 (b) Capacitive current
 (c) fault current if the fault is very near to the sub station. [6+6+4]
8. (a) Explain how the inclusion of a resistance in the neutral earthing circuit of an alternator affects the performance of the differential protection of the three-phase stator.
 (b) Describe how protection is provided in large turbo-alternators against earth-fault in the rotor [8+8]

Code No: 07A60202

R07**Set No. 3****III B.Tech II Semester Examinations, December 2010****SWITCHGEAR AND PROTECTION****Electrical And Electronics Engineering****Time: 3 hours****Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

1. Define the following terms and explain their significance in distance protection
 - (a) Reach of a distance relay.
 - (b) Under reach. [8+8]
2. For a 132kV system, the reactance and capacitance up to the location of circuit breaker is 3Ω and $0.015\mu\text{F}$, respectively. Calculate the following:
 - (a) The frequency of transient oscillation.
 - (b) The maximum value of restriking voltage across the contacts of the circuit breaker.
 - (c) The maximum value of RRRV. [16]
3.
 - (a) Describe the working of a Buchholz relay.
 - (b) A 3-phase transformer having a line voltage ratio of 400/3300V is star-delta connected. The CT's on the 400V side have a ratio of 800/5A. What must be the ratio of CT's on 3300V side? [6+10]
4.
 - (a) Explain with the aid of circuit and phasor diagrams the function of a Peterson coil in a 3-phase system. What are permissible practical deviations from resonance in the tuning of the Peterson coil?
 - (b) What are the various methods of neutral grounding. [10+6]
5.
 - (a) Explain the phenomena of lightning and the traveling waves caused by its on transmission lines.
 - (b) Draw a connection diagram of typical arc suppression coil. [8+8]
6.
 - (a) Explain the terms "breakers with external source of energy". What is the difference between such a breaker and oil circuit breaker?
 - (b) With the help of neat sketch, describe the construction of a minimum oil circuit breaker. [8+8]
7.
 - (a) What is restricted earth fault protection for generators?
 - (b) A 500kVA, 6.6kV star connected alternator has a synchronous reactance of 2Ω per phase and negligible resistance. The differential relay operates if the out-of-balance current through it exceeds 30% of the normal full load current of the alternator. If the star point of the alternator is earthed through a resistance of 6.5Ω . What percent of the stator winding is left unprotected? Show that the effect of the alternator reactance can be neglected. [8+8]

Code No: 07A60202

R07

Set No. 3

8. (a) What is the difference between a balanced voltage relay and a translay relay?
(b) Discuss the fundamental requirements of protective relaying. [10+6]

FIRSTRANKER