

Total No. of Questions : 10] [Total No. of Printed Pages : 4

Roll No.

EX-603(N)

B. E. (Sixth Semester) EXAMINATION, June, 2011

(Electrical & Electronics Engg. Branch)

SWITCHGEAR AND PROTECTION

[EX-603(N)]

Time : Three Hours

Maximum Marks : 100

Minimum Pass Marks : 35

Note : Attempt any five questions. All questions carry equal marks.

Unit-I

1. (a) Discuss the merits of per unit computation in power system. 10
- (b) The line of ground voltages on the high voltage side of a step up transformer are 100 kV, 33 kV and 38 kV on phase *a*, *b* and *c* respectively. The voltage of phase *a* leads that of phase *b* by 100° and lags that of phase *c* by 176.5° . Determine analytically the symmetrical components of voltage. 10

Or

2. (a) With the help of sequence network and relevant mathematical expression, derive the expression for fault current on a solidly grounded unloaded alternator when subjected to single line to ground fault. 10

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- (b) A small generating station has a bus bar divided into three sections. Each section is connected to a tie bar with reactors each rated at 5 MVA, 0.1 p. u. reactance. A generator of 8 MVA rating and 0.15 p. u. reactance is connected to each section of the bus bar. Determine the short-circuit capacity of the breaker of a 3-phase fault takes place on one of the sections of the bus bar.

10

Unit-II

3. (a) Discuss the functional characteristics of a protective relay and define the following terms : 10
 - (i) Pick up value
 - (ii) Reset value
 - (iii) P. S. M.
 - (iv) I. D. M. T. characteristics
- (b) What is meant by directional feature of a directional relay ? Describe the construction, principle of operation and application of a directional overcurrent relay. 10

Or

4. (a) What is meant by percent bias ? How is it achieved in practice in a differential relay ? Give its merits on a plain differential relay. 10
- (b) Explain universal torque equation. Using this equation derive the characteristics of plain impedance relay. 10

Unit-III

5. (a) Discuss the principle of arc interruption in : 10
 - (i) Oil circuit breaker
 - (ii) Air blast circuit breaker

- (b) Explain the following terms : 10
- (i) Restriking voltage
 - (ii) Recovery voltage
 - (iii) R. R. R. V.

Or

6. (a) Describe the construction, principle of operation and application of vacuum circuit breaker. 10
- (b) Differentiate between type test and routine tests on a circuit breaker. What are the different tests carried on a circuit breaker to prove its ability ? 10

Unit – IV

7. (a) What are the various abnormal operating conditions and faults to which a modern turbo alternator is likely to be subjected. 10
- (b) Discuss the protection of a three-phase alternator in the event of the following : 10
- (i) Loss of prime mover
 - (ii) Loss of excitation

Or

8. (a) Explain in detail percentage differential protection scheme of transformer. 10
- (b) For a 45 MVA, 11 kV/66 kV star delta transformer, design the percentage differential scheme. 10

Unit – V

9. (a) Describe the construction, principle of operation and application of : 10
- (i) Expulsion gap arrestors
 - (ii) Rod gap arrestors
- (b) Explain the phenomena of lightning and the protection provided against lightning. 10

Or

10. (a) What do you mean by Insulation Co-ordination and give the significance of Basic Insulation levels in Insulation co-ordination. 10
- (b) Discuss the application of the following : 10
- (i) Arc suppression coil