(Pages : 2) **1495**

Reg. No. : .....

Name : .....

Sixth Semester B.Tech. Degree Examination, April 2014

(2008 Scheme)

Branch : Electrical and Electronics

08.605 : POWER SYSTEM ENGINEERING – II

Time : 3 Hours Max. Marks : 100

PART – A

Answer **all** questions.

1. What is the difference between symmetrical and unsymmetrical fault ?
2. Which fault is more severe if it occurs at generators terminals and why ?
3. Draw a general circuit which can be used to determine the zero sequence networks of a two winding transformer. Explain.
4. Derive the equations for sequence currents for a double line to ground fault.
5. Describe the working of a HRC fuse.
6. Explain the terms (i) restriking voltage (ii) recovery voltage and (iii) RRRV.
7. Describe the problems associated with the design of a circuit breaker when interrupting small inductive current.
8. Describe a Buchholz reky and discuss its merits and demerits.
9. Describe how protection is provided in large turbo alternators against earth fault in the rotor.
10. Write notes on amplitude and phase comparators. **(10×4=40 Marks)**

PART – B

Answer **three** questions from Part **B** choosing **not** more than **one** question from **each** Module.

Module – 1

11. a) Show that sum of powers of the three symmetrical components equals the three-phase power, or in other words, symmetrical component transformation is power invarient. 8

    b) A 33 KV bus bar has a 3-phase fault level of 1000 MVA. The negative and zero sequence source reactances are $\frac{2}{3}$ and $\frac{1}{3}$ of positive sequence reactance. The zero sequence source resistance is 60Ω. A 30 MVA 33/132 KV solidly grounded Δ / Y transformer having a reactance of 0.1 pu is fed from 33 KV bus. Find fault current and fault MVA at 132 KV bus for a) 3 phase and b) line to line faults. 12

P.T.O.

12. a) Derive the equations for fault currents and voltages in the case of a single line to ground fault across an unloaded generator.

    b) A power plant has two generators of 10 MVA, 15% reactance each and two five MVA generators of 10% reactance parallelled at a common busbar from which load is taken through a number of 4 MVA stepup transformers each having a reactance of 5%. Determine the short circuit capacity of the breakers on the (i) low voltage side and (ii) high voltage side of the transformer.

Module – 2

13. a) Discuss the principle of arc interruption in an i) SF_6 circuit breaker and ii) Air break circuit breaker.

    b) In a 132 KV system the reactance per phase upto the location of the circuit breaker is $5\,\Omega$ and capacitance to earth is $0.03\,\mu F$. Calculate a) the maximum value of restriking voltage b) the maximum value of RRRV and c) the frequency of transient oscillation.

14. a) What are the different methods of testing of circuit breakers ? Discuss their merits and demerits. Which method is most suitable for testing the circuit breakers of large capacity.

    b) Explain the construction and operating principle of HVDC circuit breaker.

Module – 3

15. a) What type of protective scheme is employed for the protection of a large power transformer against short circuits ? With neat sketches discuss its working principle.

    b) An 11 KV, 100 MVA generator is grounded through a resistance of $6\,\Omega$. The CTs have a ratio of 1000/5. The relay is set to operate when there is an act of balance current of 1A. What percentage of the generator winding will be protected by the percentage differential scheme of protection.

16. a) With a neat sketch, discuss the differential scheme for bus zone protection.

    b) With the help of a block diagram, explain any one of the microprocessor based relay schemes.

(3×20=60 Marks)