Reg. No. : ....

Name : ....

Sixth Semester B.Tech. Degree Examination, May 2016
(2008 Scheme)
08.605 : POWER SYSTEM ENGINEERING – II (E)

Time : 3 Hours   Max. Marks : 100

PART – A

Answer **all** questions.

1. Write a brief note on symmetrical components.

2. What is the purpose of using reactors in the bus bars ?

3. The line currents in a 3 phase supply to unbalanced load are respectively $I_a = 10 + j\,20$, $I_b = 12 - j\,10$ and $I_c = -3 - j\,5$ amperes. The phase sequence is abc. Determine the sequence components of currents.

4. Briefly explain different types of fuses.

5. Explain the current zero method of arc interruption.

6. Draw a neat sketch of a plain break oil circuit breaker.

7. What are the different protective schemes for transformers ?

8. Distinguish between primary and back up protection.

9. What are the advantages of static relays ?

10. What are the objectives of Power System Earthing ?   **(10×4=40 Marks)**

PART – B

Module – I

11. a) For what relation between sequence reactances of an alternator, a single line to ground fault current is more than due to a 3 phase short circuit ? Derive it.   5

    b) Show that symmetrical component transformation is power invariant.   5

    c) Draw the sequence network connection for a double line to ground fault at any point in a power system and obtain expression for the fault current.   10

OR

12. Two 66 kV alternators of ratings 8 MVA and 10 MVA having % reactance of 8 and 10 are connected to a common bus bar. A transmission line of 2500 km is connected to the bus bar through a step up transformer having a % reactance of 5.5. The resistance and reactance of the line per km are 0.02 Ω and 0.015 Ω respectively. Calculate the short circuit MVA for a 3 phase symmetrical fault at the receiving end of the transmission line.   20

Module – II

13. a) Derive an expression for torque produced by an induction relay.   10

   b) Explain current setting and time setting of an over current relay. The current rating of an over current relay is 5 A. Relay setting is 200%, TMS = 0.3, CT ratio = 400/5. Determine the operating time of the relay. At TMS = 1, operating time at various PSM are   10

PSM	2	4	5	8	10	20
Operating time in secs.	10	5	4	3	2.8	2.4

OR

14. a) Discuss the operating principle of SF$_6$ circuit breaker. What are its advantages over other types of CBs ?   10

   b) In a 132 kV system, the reactance per phase upto the location of the CB is 5 Ω and capacitance to earth is 0.03 μF. Calculate

   a) maximum value of restriking voltage

   b) maximum value of RRRV

   c) frequency of transient oscillation.   10

Module – III

15. a) With neat sketch, explain the percentage differential protection employed for the protection of large Y-Δ power transformer against short circuits.   10

   b) A 3 phase 33/6.6 kV Y-Δ transformer is protected by differential system. The CTs on side have a ratio of 300/5. Determine the ratio of CTs on the HT side.   10

OR

16. a) Explain the principle of operation of any one type of amplitude comparator with diagram.   10

   b) What is an impedance relay ? Explain its operating principle. How it is realized using amplitude comparator ?   10