Reg. No. : ....

Name : ....

Seventh Semester B.Tech. Degree Examination, November 2013
(2008 Scheme)
08.702 : POWER SYSTEM ENGINEERING – III (E)

Time : 3 Hours　　　　　　　　　　　　　　　　　　　　Max. Marks :100

Instruction : *Answer all questions from Part A and one full questions from each Module of Part B.*

PART – A

1. What is the need of swing bus in load flow analysis ?

2. What is meant by sparcity associated with Y_{BUS} ? Explain its features.

3. Derive the expression for penalty factor ? Explain its significance in economic operation.

4. Distinguish between unit commitment and economic dispatch problem.

5. Derive the expression for real power flow through a transmission line in a two bus system. How the system will respond to series compensation to the above system ?

6. Compare compensation scheme provided by STATCOM and SVC.

7. What is meant by steady state stability and steady state stability limit ?

8. Explain the principle of operation of a surge diverter.

9. Write a short note on HVDC development in India.

10. What is the need of speed-time graph in electric traction ? Also draw a typical speed time graph for suburban service.　　　　　　　　　**(10×4=40 Marks)**

PART – B

Module – I

11. a) Derive the expression for basic power flow equation and voltage up date equation in GS methods.   6

b) Use Gauss-Seidel method to determine the voltage at bus 2 and 3 at the end of 2 iteration. Also obtain slack bus real and reactive power. Line impedances are in p.u.   14
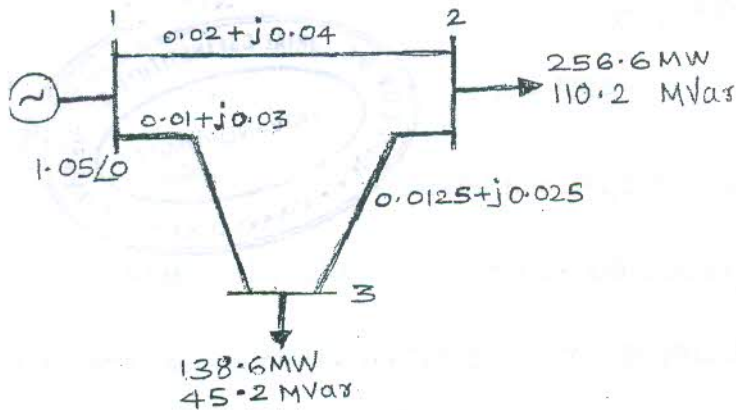
12. a) Derive Jacobian elements in rectangular form for NR method of load flow study.   10

b) The fuel cost of two units are given by

$$C_1 = 1.0 + 25\,P_1 + 0.2\,P_1^2 \text{ Rs/hr}$$

$$C_2 = 1.5 + 35\,P_2 + 0.2\,P_2^2 \text{ Rs/hr}$$

If the total demand on the generator is 200 MW. Find the economic load scheduling of the two unit.   10

Module – II

13. a) Explain briefly basic generator control loops with the help of neat sketch.   8

b) Briefly explain how reactive power compensation is achieved through following devices :

i) Shunt capacitor

ii) Synchronous compensator and

iii) Series capacitor.   12

14. a) What is the basic principle of operation of FACTS devices ? 4

b) What is the objective of TCSC in power system ? Explain. 6

c) A transmission line is acting as an interconnector between two constant voltage networks. Determine graphically or otherwise the maximum additional load which can be suddenly applied to this interconnector already carrying 70 MW if power angle equation is 120 Sin δ. 10

Module – III

15. a) A train runs at an average speed of 50 Kmph between station situated 2.5 km. apart. The train accelerate at 2 Kmphps and retard at 3 Kmphps. Find its maximum speed. Draw the speed time curve for the run and calculate also the distance travelled by it before the brakes are applied. 10

b) Explain the basic principle of operation of HVDC system with the help of a neat sketch. 6

c) Explain the working of Bipolar HVDC link. 4

16. a) Discuss different type of over voltages in power system. How we can protect the system from over voltages ? 10

b) Explain how insulation co-ordination is carried out in a 220 kV substation. 10