Roll No. .....

24228

B.Tech. 5th Sem. (Electrical Engg.) I Examination, December, 2013

POWER SYSTEMS-I

'F' Scheme

Paper : EE-315-F

Time : Three hours] *[Maximum Marks : 100*

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Q. No. **1** is ***compulsory***. Attempt ***one*** question from each Section.

1. (a) Define current distribution factor. 20

(b) What is penalty factor.

(c) Why load frequency control is important in the operation of power system.

(d) Define complex power.

(e) State Gauss-seidal load flow formula.

(f) Why load flow studies are carried out.

SECTION – A

2. A 275 KV Transmission line has the following line constant : $A = 0.85, < 5^\circ; B = 200 < 75^\circ$. 20

(a) Determine the power at unity power factor that can be received if voltage profile at each end is to be maintained at 275 KV.

(b) What type rating and compensation equipment would be required if load is 140 mw at unity power factor with same voltage profile as in part (a) ?

(c) With load as in part (b) what would be receiving end voltage if the compensation equipment is not installed.

3. (a) What are the types of Relays used in power system ? Explain modified impedance relay. 10

(b) A three phase transformer rated for 66 KV/11KV is connected Y/Δ and protecting CTs on the LV side have a ratio of 400/5. Determine the ratio of the CTs on the HV side. 10

SECTION – B

4. (a) Draw the flow-chart of Newton-Raphson method for load flow studies. Including P-v buses. Explain each block of chart. 10

(b) Derive static load flow equation of power system. Explain the Newton-Raphson method of solving the load flow equation. 10

5. (a) Draw the flow chart for load flow solution by Gauss-seidal iteration method and explain. 10

(b) Discuss advantage of using Y_{bus} model of power system network for load flow analysis. 10

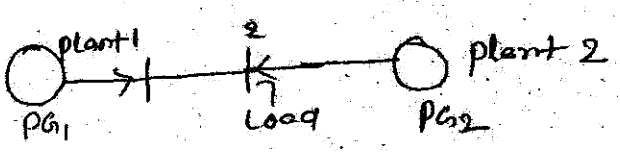
SECTION – C

6. (a) Sketch the fundamental hydrothermal system and explain it with mathematical formula. 10

(b) A Two bus system shown in fig. If 140 MW is transmitted from plant 1 to the load transmission loss of 20 mw is incurred. Find the required generation for each plant and power received by load when system λ is 30/mwh the incremental full cost of two plants are given : 10

$$\frac{dc_1}{dPG_1} = 0.02\, PG_1 + 16.0 \text{ Rs./mwh.}$$

$$\frac{dc_2}{dPG_2} = 0.04\, PG_2 + 20.0 \text{ Rs./mwh.}$$



7. (a) Draw the curve between fuel cost and power output and explain optimal operation of generator. 8

(b) Incremental fuel cost in rupees per mwh for a plant consisting of two units are : 12

$$\frac{dc_1}{dPG_1} = 0.020\ PG_1 + 40.0; \frac{dc_2}{dPG_2} = 0.30\ PG_2 + 45.0$$

Assume that both units are operating at all times and total load varies from 40 mw to 260 mw and maximum and minimum load on each unit are to be 120 mw and 15 mw respectively. How will the load be shared between two units as the system load varies over full range. What are the corresponding values of plant incremental costs ?

SECTION – D

8. (a) With circuit diagram explain alternator voltage regulator scheme, also explain in detail, each component. 10

(b) With suitable turbine speed governing system. Explain the single area load frequency control. 10

9. Formulating the state model explain optimal (Two area) load frequency control. 20