6. (a) Draw the functional diagram of a power control mechanism of an individual generator and explain the operation of various components to control the power generation.

(b) A 100 MVA synchronous generator operates on full load at a frequency of 50 Hz. The load is suddenly reduced to 50 Mw. Due to time lag in governor system, the steam valve begins to close after 0.4 second. Determine the change in frequency that occurs in this time. Given $H = 5$ Kw-sec/kVA of generator capacity.

7. (a) Explain the block diagram Q-V control.

(b) Explain about primitive and emergency control.

8. Write short notes on the following :

(a) Optional scheduling of hydro-thermal stations

(b) Economic dispatch control

(c) Stability enhancement methods.

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[2537/I/12]

[06 – 4210]

IV/IV B.E. DEGREE EXAMINATION.

Second Semester

Electrical and Electronics Engineering

POWER SYSTEM OPERATION AND CONTROL

(Effective from the admitted batch of 2006–2007)

Time : Three hours Maximum : 70 marks

Question No. 1 is compulsory.

Answer any FOUR from the remaining.

All questions carry equal marks.

1. Answer the following :

(a) What is the effect of speed governor dead band on AGC?

(b) Name the various costs associated with hydro plants.

(c) Explain the concept load frequency control.

(d) Write about centre of inertia.

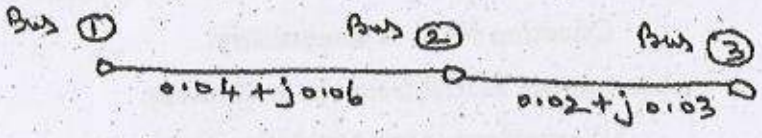
(e) What do you understand by power system security? Explain.

(f) Distinguish between Decoupled Load Flow (DLF) solution and Fast Decoupled Load Flow (FDLF) solution.

(g) Write briefly about coherent area dynamics.

2. (a) Give the comparison of load flow methods.

(b) For the network shown below, obtain the complex bus bar voltage at bus 2 at the end of first iteration, using Gauss-Seidal method, Line impedances shown are in p.u.



Given Bus ① in slack with $V_1 = 1.0 \angle 0^\circ$

$P_2 + jQ_2 = -5.96 + j1.46$, $|V_3| = 1.02$

Assume $V_3^* = 1.02 \angle 0^\circ$ and $V_2^* = 1.0 \angle 0^\circ$.

3. (a) Explain how the incremental production cost of a thermal power station can be determined.

(b) The incremental fuel costs of two units of a plant are given by

$$\frac{dF_1}{dP_1} = 3P_1 + 400 \text{ Rs/Mwh}$$

$$\frac{dF_2}{dP_2} = 4.5P_2 + 350 \text{ Rs/Mwh}$$

The units are to be operated with limiting values of $P_{max} = 125$ Mw and $P_{min} = 20$ Mw

Find the economic loading of the units for a plant load of (i) 225 Mw and (ii) 40 Mw.

4. (a) Explain block diagram of load-frequency control.

(b) Two generators are operating in parallel with 4% and 5% droop characteristics of their respective governor sharing a load of 500 Mw. Find the load shared by machines and the system frequency of this load. The normal frequency of the system is 50 Hz.

5. (a) Draw the schematic diagram of alternator voltage regulator scheme. Draw the block diagram of the system and explain the function of important components.

(b) What do you understand by penalty factors? Explain.