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- N.B. : (1) Question No. 1 is **compulsory**.
 (2) Attempt any **four** questions out of remaining.
 (3) Assume **suitable** data if **required**.

MASTER

1. (a) Derive the expression for transmission loss using B-coefficients. 10
 (b) Two generating units are operating in parallel. Incremental fuel costs in Rs/Mwh for the two units are 10

$$dc_1/dPG_1 = 0.20 PG_1 + 40; 30 \text{ Mw} \leq PG_1 \leq 175 \text{ Mw.}$$

$$dc_2/dPG_2 = 0.40 PG_2 + 30; 20 \text{ Mw} \leq PG_2 \leq 125 \text{ Mw.}$$

How the load is shared among two units as system load varies from minimum to maximum ? What is the corresponding incremental fuel cost?
2. (a) Explain the speed governing system used for automatic load frequency control and hence derive the transfer function for the same. 10
 (b) Two generators rated 200 Mw and 400 Mw are operating in parallel. The droop characteristics of their governors are 4% and 5% respectively from no load to full load. Assuming that generators are operating at 50 Hz at no load. How a load of 600 Mw would be shared between them ? What will be system frequency at this load ? State the assumptions. 10
3. (a) Explain the equal area criterion of stability for the sudden change in mechanical input. 10
 (b) Find the steady state power limit of a system consisting of a generator equivalent reactance 0.50 pu, connected to an infinite bus bar through a series reactance of 1.0 pu. The terminal voltage of generator is held at 1.20 pu and voltage of infinite bus is 1.0 pu. 10
4. (a) Write an algorithm for G.S. method for load flow analysis when buses present are PQ and PV. 10
 (b) Compare GS and NR methods for load flow. 10
5. (a) Explain the step by step solution of swing equation. 10
 (b) Discuss the dynamic response of an isolated power system. 10
6. (a) Derive the condition of economic load dispatch considering the transmission losses. 10
 (b) A synchronous motor of negligible resistance is receiving 25% of power that is capable of receiving from an infinite bus. If load on synchronous motor is suddenly doubled, calculate the maximum value of power angle δ during the swinging of motor around its new equilibrium position (assume $P_e = 1 \sin \delta$). 10
7. Write short notes on :- 20
 - (a) Sources and effects of harmonics
 - (b) Methods of voltage control
 - (c) Various types of buses in load flow study.