

17643

15162

3 Hours / 100 Marks

Seat No.

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- Instructions :** (1) Answer each next main Question on a new page.
(2) Illustrate your answers with neat sketches wherever necessary.
(3) Assume suitable data, if necessary.

Marks

1. (A) Attempt any THREE : 12
- (a) State the significance of buses in power system.
 - (b) Why the utilities want to maintain constant frequency ?
 - (c) List out the information that can be collected from load flow analysis.
 - (d) Define steady state stability, transient stability and dynamic state stability.
- (B) Attempt any ONE : 6
- (a) Considering a simple two bus system derive $I_{bus} = V_{bus} Y_{bus}$.
 - (b) List out data required for load flow studies.
2. Attempt any FOUR : 16
- (a) State and explain different types of buses in power system.
 - (b) Explain briefly the relation between real power and frequency of the system.
 - (c) List out the significant features Y_{bus} matrix.
 - (d) State and explain 'bus loading' and 'Line-flow-equation'.
 - (e) Write the "swing equation" and state its significance.
 - (f) Explain the power system stability with the help of simple two machine model.

3. Attempt any FOUR : **16**

- (a) State the difference between “shunt compensation” and “synchronous compensation”.
- (b) State the need of reactive power compensation and state its classification.
- (c) Derive the equation to prove that voltage drop across the tr. line is mainly due to reactive power flow.
- (d) Write SLFE for two bus power system and define each parameters.
- (e) List out the factors that governs load shedding.
- (f) With reference to Indian Power System, state the types of LDC and their locations.

4. (A) Attempt any THREE : **12**

- (a) Determine the self-admittances of 3-bus system with the following data :

Bus Code $i - k$	Line Impedance z_{ik}	Line charging admittance y_{ii}
1 – 2	$0.02 + j0.06$	$j0.03$
1 – 3	$0.08 + j0.04$	$j0.025$
2 – 3	$0.06 + j0.018$	$j0.020$

- (b) List out the advantages Y_{bus} .
- (c) List out the various methods of voltage control and their field of applications.
- (d) Explain the working of turbine speed governing system with the help of block diagram.

(B) Attempt any ONE : **6**

- (a) Explain with the help of block diagram working of Automatic load frequency and voltage control loops of a synchronous generator.
- (b) State and explain the various planning tools used for load forecasting.

5. Attempt any FOUR : 16

- (a) State and explain conventional methods of improving transient stability. (any two)
- (b) State the adverse effects powers system instability.
- (c) With the help of diagram, explain the reactive power injection method used for voltage control.
- (d) With the help of block diagram, explain load-frequency control using single area case.
- (e) List out the functions of state load dispatch centre.
- (f) With the help of incremental fuel cost curve explain the economic load dispatch.

6. Attempt any FOUR : 16

- (a) With the help of labelled diagram explain the functioning of Automatic Voltage Control System.
- (b) How voltage can be controlled in power system with the help of transformer ?
- (c) Derive the expression for max. power flow under steady state condition.
- (d) What is “stability limit” ? State the difference between “steady state stability limit” and “transient state stability limit”.
- (e) How environmental and social factors affect the load forecasting in power system ?
- (f) The incremental fuel curve of two units of a generating station are
$$dF/dP_1 = 0.4P_1 + 40 \text{ Rs/MWh}$$
$$dF/dP_2 = 0.5P_2 + 35 \text{ Rs/MWh}$$

Determine load distribution between the two units under economical load dispatch, if the total load on generating station is 500 MW.
