17643

11819

3 Hours / 100 Marks Seat No. | | | | | | | | |

Instructions : (1) All Questions are *compulsory.*

(2) Answer each next main Question on a new page.

(3) Illustrate your answers with neat sketches wherever necessary.

(4) Figures to the right indicate full marks.

(5) Assume suitable data, if necessary.

(6) Use of Non-programmable Electronic Pocket Calculator is permissible.

Marks

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

(a) State and explain different types of buses in power system. Write their significance.

(b) List any eight advantages of reactive power compensation.

(c) State the details of information obtained from load flow studies.

(d) Define the terms :

(i) Steady state stability and its limit.

(ii) Dynamic state stability.

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

(a) For a simple two bus power system, derive the equation :-

$I_{bus} = V_{bus}\ Y_{bus}$.

(b) Draw single line diagram of a power system with the following data. Also draw admittance diagram.

BUS to BUS P – q	Line Impedance in PU Z_{pq}	Line Charging admittance (PU) $Y_{pq/z}$
1 – 2	0.08 + j0.35	j0.01
2 – 3	0.06 + j0.08	j0.02
1 – 3	0.05 + j0.05	j0.00

2. Attempt any FOUR : **16**

(a) Explain why consumer demand constant frequency supply.

(b) List out the significant features of Y_{bus} matrix.

(c) State and explain 'bus loading' and 'Line flow equation'.

(d) Write the swing equation and state its significance.

(e) State the difference between following terms :-

(i) Power system stability

(ii) Power system instability

(iii) Stability limit

(iv) Overall stability

(f) Write SLFE for a two bus system and its parameters.

3. Attempt any FOUR : **16**

(a) State the various methods of reactive power compensation and write their field of applications.

(b) Derive the equation to prove that voltage drop across transmission line is mainly due to reactive power flow.

(c) List out the factors that governs load shedding.

(d) State the need of load flow analysis referred to power system operation.

(e) State the types of LDC and their locations wrt Indian Power System.

(f) State the adverse effects of power system instability.

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

(a) Derive the equation for maximum power limit under steady state stability condition of a power system.

(b) State the need of load forecasting in power system operation.

(c) Draw a labelled schematic diagram of 'Automatic Voltage Control' system.

(d) List out the various methods of voltage control and their field of applications.

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

(a) Describe the operation of turbine speed governing system with help of block diagram.

(b) State and explain the various planning tools used for load forecasting.

5. Attempt any FOUR : **16**

(a) State and explain the factors affecting the transient stability of a power system.

(b) State and explain any two methods of improving transient stability.

(c) With the help of block diagram, explain load-frequency control using single area case.

(d) List out the major four functions of load dispatch centre.

(e) Describe the economic load dispatch using the incremental fuel cost curve.

(f) Explain the reactive power injection method used for voltage control.

P.T.O.

6. Attempt any FOUR : **16**

(a) State the significance of power angle diagram.

(b) State and explain the concept of dynamic stability of a power system.

(c) How voltage can be controlled in power system with the help of transformer ?

(d) What are environmental and social factors to be considered in load forecasting ?

(e) The incremental fuel curve of two units of a generation station are as :

$$\frac{dF}{dP_1} = 0.45.\ P_1 + 40 \text{ Rs/MWh}$$

$$\frac{dF}{dP_2} = 0.5\ P_1 + 30 \text{ Rs/MWh}$$

Determine the fuel cost of each unit if load of 4000 MW is equally distributed.

(f) Describe the relation between real power flow and frequency.
