

17643

11920

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) Figures to the right indicate full marks.
 - (4) Use of Non-programmable Electronic Pocket Calculator is permissible.

Marks

1. (A) Attempt any THREE : 12
 - (a) State the difference between 'Load bus' and 'Generator bus'.
 - (b) State and explain the relation between 'Real Power flow' and 'frequency' in a power system.
 - (c) State any two voltage control methods adopted in following areas :
 - (i) Generating station
 - (ii) Sub-stations
 - (d) State the necessity of voltage control in power system operation.
 - (B) Attempt any ONE : 06
 - (a) Derive $Y_{bus} V_{bus} = I_{bus}$ for a simple two-bus power system.
 - (b) State and explain any three methods of improving transient stability condition in a power system.
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2. Attempt any FOUR : 16
 - (a) State the effect of change in frequency on various consumers and utilities.
 - (b) List out the advantages of reactive power compensation in power system.
 - (c) List out the data required for Load flow studies.
 - (d) State the characteristics of Y_{bus} matrix.

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- (e) With reference to power system define –
 - (i) Steady state stability
 - (ii) Steady state stability limit
 - (iii) Transient state stability
 - (iv) Transient state stability limit
- (f) State and explain ‘dynamic state stability’ and ‘overall stability’ of a power system.

3. Attempt any FOUR :**16**

- (a) State and explain concept of reactive power compensation.
- (b) State the difference between shunt compensation and series compensation refer to reactive power compensation.
- (c) Write SLFE of a simple two bus power system and define it’s parameters.
- (d) List out the informations that can be collected from load flow studies.
- (e) Derive the equation for maximum power flow under steady state condition, considering a simple two bus power system.
- (f) Draw and explain power angle diagram neglecting losses in the system.

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

- (a) State and explain following equations refer to power system :
 - (i) Bus loading equation
 - (ii) Line flow equation
- (b) State the advantages of Y_{bus} matrix in load flow studies.
- (c) Write ‘Swing equation’ referred to power system and define it’s parameters.
- (d) List out the methods of improving transient stability in a power system.

(B) Attempt any ONE :**06**

- (a) Draw neat labelled schematic diagram of turbo generator with load-frequency control and voltage control.
- (b) List out the functions of Load Dispatch Centre. (LDC)

5. Attempt any FOUR :

16

- (a) Develop
- Y_{bus}
- matrix for a 3 bus system with following details :

Bus Code	Line impedance (Pu)	Bus Code	Line Charging admittance (Pu)
1 – 2	$0.085 + j0.32$	1	$j0.01$
2 – 3	$0.045 + j0.06$	2	$j0.03$
1 – 3	$0.055 + j0.08$	3	$j-0.00$

- (b) With the help of diagram explain voltage control by reactive power injection method.
- (c) State the functions of following systems referred to ALFC & AGC
- Hydraulic amplifier
 - Frequency integrator
 - Governor
 - Comparator
- (d) State the necessity of load forecasting in power system operation.
- (e) “Load shedding is adopted during the operation of power system.” Give reason.
- (f) Refer to Indian power system scenario state the types of LDC and their locations.

6. Attempt any FOUR :

16

- (a) Refer to Y_{bus} matrix, define
- driving point admittance
 - transfer admittance
- (b) With the help of diagram explain voltage control by
- tap changing transformer
 - Booster transformer
- (c) Explain the concept of single area control referred to Load frequency control.
- (d) List out the environmental factors that affects load forecasting.

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- (e) Draw and explain the incremental fuel cost curve.
- (f) Incremental fuel cost curve of two generating units are as

$$dF_1/dP_1 = 0.12 P_1 + 20$$

$$dF_2/dP_2 = 0.10 P_2 + 15$$

If the load on power plant is 410 MW, determine the most economical load sharing between two.
