

Total No. of Questions : 8]

SEAT No. :

**PE2214**

[Total No. of Pages : 2

[6584]-114

**B.E. (Electrical Engineering)**

**POWER SYSTEM OPERATION AND CONTROL**

**(2019 Pattern) (Semester - VII) (403141)**

*Time : 2½ Hours]*

*[Max. Marks : 70*

*Instructions to the candidates:*

- 1) *Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.*
- 2) *Figures to the right indicate full marks.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Assume suitable additional data is necessary.*
- 5) *Use of non-programmable calculator is allowed.*

- Q1) a)** Draw and explain the working of speed governor system of turbo generator. **[4]**
- b)** Obtain the generator model, turbine model and power system model of single area load frequency control. **[6]**
- c)** Explain the block diagram and frequency response of the proportional plus integral controller in the single area load frequency control. **[8]**

OR

- Q2) a)** Write the short note and necessity of automatic generation control (AGC). **[4]**
- b)** Explain: **[6]**
- i) Area Control Error (ACE) in single area load frequency control
  - ii) Area Control Error (ACE) in two area load frequency control.
- c)** With the neat block diagram, explain two areas of load frequency control. **[8]**

- Q3) a)** Explain the concept of cost curve of thermal unit. **[3]**
- b)** Explain the dynamic programming method used for unit commitment. **[6]**
- c)** Explain Lagrange multiplier method used for economic load dispatch without transmission loss and no constraints on generation limit, while meeting load. **[8]**

OR

**P.T.O.**

- Q4)** a) What is the need for a unit commitment study in the power system? Explain. [3]  
 b) State the various methods for the unit commitment. Hence, explain the 'priority list method' for unit commitment. [6]  
 c) The fuel costs of a two-unit plant are given by [8]

$$C_1 = 100 + 2P_1 + 0.005 P_1^2$$

$$C_2 = 200 + 2P_2 + 0.01 P_2^2$$

Where  $P_1$  and  $P_2$  are in MW. The plant supplies a load of 450 MW. Find economic load scheduling pf the two units and the incremental fuel cost. Neglect losses.

- Q5)** a) What is the interconnection of the power system? State its advantages. [4]  
 b) Explain in detail-Capacity Interchange. [6]  
 c) What are the criteria of applying capacity interchange, diversity interchange, inadvertent interchange between interconnected utilities. [8]

OR

- Q6)** a) Explain in detail: Interchange evaluation with unit commitment. [4]  
 b) Explain the following. [6]  
 i) Emergency power interchange  
 ii) Energy banking.  
 c) Explain the concept of a power pool in energy control. State and explain the advantages associated with a power pool? Also, discuss constraints related to the power pool. [8]

- Q7)** a) What are the effects of voltage instability on the power system? Explain in detail. [4]  
 b) Give the detailed classification of the voltage stability based on the time frame and based on nature of the disturbance. [6]  
 c) Derive the expression of the power-voltage relationship for drawing the PV curve in detail and hence draw the PV curve with showing stable-unstable region [7]

OR

- Q8)** a) Define the following terms: [4]  
 i) Voltage Stability  
 ii) Voltage Collapse  
 b) Explain the following voltage stability indices with their formula [6]  
 i) Fast Voltage Stability Index (FVSI)  
 ii) Line Stability Index (Lmn)  
 iii) Line stability factor (LQP)  
 c) State the procedure to draw the QV curve. Hence, draw the QV curve with showing stable-unstable regions. [7]

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