Total No. of Questions : 8]

SEAT No. : ____

P-6574

[Total No. of Pages : 3

[6181]-125

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, if necessary.***
5) ***Use of a non-programmable calculator is allowed.***

Q1) a) Comment on : The necessity of automatic generation control. **[4]**

b) Explain following concepts **[6]**

i) Control area concept

ii) Area control error

c) Explain the working of the speed governor system of the turbo generator with a schematic diagram. **[8]**

OR

Q2) a) Draw the complete transfer function block diagram representing single are load frequency control including the speed governing model, turbine model and generator load model. **[4]**

b) Draw and explain the complete block diagram of proportional and integral load frequency control of an isolated power system. **[6]**

c) Explain the steady state analysis of single area load frequency control along with its block diagram and two cases: **[8]**

Case i) When the speed changer has a fixed setting and load demand is varying

Case ii) When load demand is fixed and the speed changer setting is varying

P.T.O.

Q3) a) Explain the heat rate curve and cost curve of a thermal generating unit. **[4]**

b) Discuss the economic scheduling of thermal plants (method of Lagrange's multiplier) neglecting the effect of transmission losses. **[6]**

c) Three power plants of total capacity 425MW are scheduled for operation to supply a total load of 300 MW. Find the optimum load scheduling if the pants have the following incremental cost characteristics and generator constraints. **[7]**

$$\frac{dF_1}{dP_{g1}} = 30 + 0.15P_{g1};\ 25 \le P_{g1} \le 125$$

$$\frac{dF_2}{dP_{g2}} = 40 + 0.20P_{g2};\ 30 \le P_{g2} \le 100$$

$$\frac{dF_3}{dP_{g3}} = 15 + 0.18P_{g3};\ 50 \le P_{g3} \le 200$$

OR

Q4) a) Discuss hydro constraints and thermal constraints used for Unit Commitment. **[4]**

b) Discuss the economic scheduling of thermal plants considering the effect of transmission losses. **[6]**

c) Determine the Priority list method using full-load average production cost for the data given below : **[7]**

Unit No.	Loading Limits		Heat rate curve Parameters			Fuel Cost (K_i) (Rs/kCal)
	Mm (MW)	Max (MW)	a	b	c	
1	100	400	0.006	7	600	1.1
2	50	300	0.01	8	400	1.2
3	150	500	0.008	6	500	1.0

Q5) a) What is power system interconnection? State its advantages. **[4]**

b) Explain the operation of power pools. **[6]**

c) Explain the following type of power interchange: Diversity Interchange. **[8]**

OR

Q6) a) Explain in detail: Capacity Interchange. **[4]**

b) Write a short note on Interchange evaluation with unit commitment. **[6]**

c) Comment on : **[8]**

i) Inadvertent Power Exchange

ii) Energy Banking

Q7) a) Draw the QV curve with appropriate labeling showing stable and unstable regions. **[4]**

b) What happens when there is voltage instability in the power system? Explain in detail. **[6]**

c) Why voltage stability study has to gain importance in the power system study? Explain. **[7]**

OR

Q8) a) Draw the PV curve with appropriate labeling showing a stable-unstable region. **[4]**

b) What observations were obtained from the PV curve? Enlist the disadvantages of the PV curve. **[6]**

c) Give the detailed classification of the voltage stability based on the time frame and based on nature of the disturbance. **[7]**