Total No. of Questions : 8]

SEAT No. :

PC2391

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B.E. (Electrical Engineering)

POWER SYSTEM OPERATION & CONTROL

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

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.***
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 non-programmable calculator is allowed.***

Q1) a) Explain the concept of automatic generation and control in a power system. **[4]**

b) Explain the droop characteristics of the speed governor system. **[6]**

c) Explain with a block diagram the working of a proportional plus integral load frequency controller for an isolated power system. **[8]**

OR

Q2) a) List out the reasons for limiting the frequency deviations. **[4]**

b) Write a short note on **[6]**

i) Speed governing model.

ii) Turbine model.

c) Draw a schematic diagram illustrating the two-area load frequency scheme label and functions of the key components. **[8]**

Q3) a) Explain the incremental cost curve of a thermal generating unit with a neat diagram. **[3]**

b) Define the following term **[6]**

i) Minimum up time

ii) Minimum down time

iii) Spinning reserve

c) Explain with mathematical formulation, the economic load dispatch without transmission loss and including equality constraints of meeting load. **[8]**

OR

P.T.O.

Q4) a) Define term loss coefficient (β_{mn}). **[3]**

b) The fuel cost of a two generators are given by **[6]**

$C_1 = l.6 + l5P_1 + 0.1\,P_1^2$ (Rs/h)

$C_2 = 1.8 + 25P_2 + 0.1\,P_2^2$ (Rs/h)

Where P_1 and P_2 in MW. The plant supplies a load of 250 MW. Find the economic load scheduling of two generators and the incremental fuel cost. Neglect losses.

c) State various methods of unit commitment and explain the "Priority list method" of unit commitment with one example. **[8]**

Q5) a) What factors influence the magnitude and direction of power flow between interconnected utilities? **[4]**

b) What protocols or agreements govern for emergency power interchange between utilities during grid emergencies? **[6]**

c) What are power pools and how do they function in the context of regional or multi-state power markets? **[8]**

OR

Q6) a) What factors contribute to an inadvertent power exchange between interconnected grids? **[4]**

b) Explain the economic interchange between interconnected utilities with an example. **[6]**

c) What is energy banking and how does it facilitate power exchange between utilities? **[8]**

Q7) a) What is voltage collapse? **[3]**

b) What are common voltage stability indices used in power system analysis? **[6]**

c) State the procedure to draw a QV curve. What information does the QV curve provide? **[8]**

OR

Q8) a) How does variation in load demand affect voltage stability in the power system? **[4]**

b) What is the PV curve and how is it used to analyze the voltage stability in the transmission system? **[7]**

c) How does steady-state voltage stability differ from dynamic voltage stability? **[6]**