

Please check that this question paper contains 9 questions and 2 printed pages within first ten minutes.

[Total No. of Questions:09]

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Uni. Roll No. z.....

Program: B.Tech. (Batch 2018 onward)

Semester: 6<sup>th</sup>

Name of Subject: Power System-II (Operation & Control)

Subject Code: PCEE-114

Paper ID:17226

Time Allowed: 03 Hours

Max. Marks: 60

NOTE:

- 1) Parts A and B are compulsory
- 2) Part-C has Two Questions Q8 and Q9. Both are compulsory, but with internal choice
- 3) Any missing data may be assumed appropriately

Part – A

[Marks: 02 each]

Q1.

- a) What are ancillary services in a power system.
- b) Why SCADA is implemented in a power system.
- c) List out the advantages of the per-unit system.
- d) What do you mean by speed regulation or droop.
- e) A generator rated 25MVA, 11kV has a reactance of 15%. Calculate its p.u. reactance for a base of 50MVA and 10kV
- f) A 60 Hz, four-pole turbogenerator rated 100MVA, 13.8 kV has an inertia constant of 10 MJ/MVA. Calculate the energy stored in the rotor at synchronous speed and also find the rotor acceleration if the input to the generator is suddenly raised to 60 MW for an electrical load of 50 MW.

Part – B

[Marks: 04 each]

- Q2. What is the load flow problem and also give the classification of buses from load flow studies along with specified and unspecified quantities.
- Q3. Compare Gauss-Seidel, Newton Raphson, and Fast Decoupled methods with respect
  - i. Number of iterations
  - ii. Convergence characteristics
  - iii. Initial values

- Q4. Discuss point by point method for solving swing equation for transient stability analysis of a power system.
- Q5. The line data of a power system is given in Table (1). Formulate bus admittance matrix.

Line Number	From Bus	To Bus	Line Impedance ( $\Omega$ )
1	1	2	$10+j40$
2	1	4	$15+j50$
3	2	3	$5+j25$
4	2	4	$15+j20$
5	3	4	$10+j30$

Table(1)

- Q6. Two generators rated 250 MW and 400 MW are operating in parallel. The droop characteristics of the governor are 4% and 6% respectively. How would a load of 650 MW be shared by them? What will be the system frequency? Assume nominal system frequency is 60 Hz and no governing action.
- Q7. What is a Static VAR compensator(SVC) and also explain the working principle of SVC?

Part – C

[Marks: 12 each]

- Q8. Explain how the equal-area criterion is applied when there is a sudden (i) increase in power input (ii) decrease in the power output due to a three-phase fault?

OR

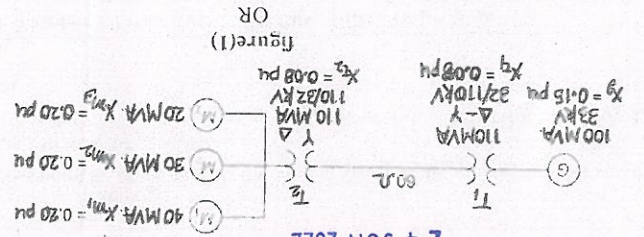
What do you understand by load frequency control? Draw the block diagram for load frequency control. Describe all components involved in this control. How two parallel-connected generating units share the load as per their droop characteristics.

- Q9. A 100 MVA, 33kV, the three-phase generator has a reactance of 15%. The generator is connected to motors through a transmission line and a transformer as shown in the figure (1). Motors have rated input of 40 MVA, and 30 kV with 20% reactance each. Draw the per-unit circuit diagram.



Develop and explain the block diagram of an automatic generation control of two area power system.

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OR  
figure(1)

24 JUN 2022

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