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Reg. No. : .....

Name : .....

Sixth Semester B.Tech. Degree Examination, December 2018

(2013 Scheme)

13.605 : POWER SYSTEM ANALYSIS AND STABILITY (E)

Time : 3 Hours Max. Marks : 100

Instruction : *Answer **all** questions in Part **A** carrying **2** marks **each**. Answer **one** question from **each** Module in Part **B**. **Each full** question in Part **B** carries **20** marks.*

PART – A

1. When is it necessary to change the base quantities to express a system in per unit ? Demonstrate using a simple example.

2. Draw the zero sequence equivalent circuit of a three phase transformer in (i) Y – Y and (ii) Δ – Y.

3. What are the major assumptions to be considered before drawing the reactance diagram of a power system ?

4. What are the types of buses in load flow analysis ?

5. Why is Bus Admittance Matrix used in load flow analysis instead of Bus Impedance Matrix ?

6. What are the reasons for the speed of convergence of Fast decoupled load flow ?

7. What is the difference between Economic Dispatch and Unit Commitment ?

8. What are the two areas considered in equal area criterion ?

9. What do you mean by Automatic Voltage Regulator ?

10. What is steady state power transfer limit of a transmission line ? **(10×2=20 Marks)**

P.T.O.

PART – B

Module – I

11. The reactances of a generator rated 100 MVA, 20 kV are $X_d'' = X_1 = X_2 = 20\%$ and $X_0 = 5\%$. The generator is connected to a $\Delta - Y$ transformer rated 100 MVA, 20 kV/230 kV, with a reactance of 10%. The neutral of the transformer is solidly grounded. The terminal voltage of the generator is 20 kV, when a three phase to ground fault occur on the open circuited , high voltage side of the transformer. Find the initial symmetrical rms current in all phases of the generator. **20**

OR

12. Draw the sequence network of a generator and derive the equations for fault currents in phase reference frame and 012 reference frame when (i) line to line fault and (ii) single line to ground fault occur at the phase terminals through a fault impedance Z_f and there is a neutral impedance Z_n. **20**

Module – II

13. Given the bus data for the system,

Line No.	Bus Code (p – q)	Line Impedance in p.u.
1	1 – 2	0.08 + j0.20
2	1 – 3	0.05 + j0.10
3	2 – 3	0.04 + j0.12

Bus No.	|V|	δ	P_d	Q_d	P_g	Q_g
1	1.01	0.0	0.0	0.0	–	–
2	1.01	–	0.5	0.4	0.8	-
3	–	–	0.8	0.6	0.0	0.0

Determine the voltages at buses after two iterations of Gauss Seidel algorithm. **20**

OR

14. Derive the Jacobian matrix for Newton Raphson method of load flow for a three bus system having one slack bus, one PV bus and one PQ bus. **20**

Module – III

15. a) Hydro-thermal scheduling can be done in a short term or long term basis. What are the differences in the algorithm for both ? **10**

b) Why do power system operators adopt Unit Commitment ? **10**

OR

16. a) Explain the Lambda iteration method of economic dispatch and show graphically that the result guarantees optimality. **10**

b) A constant load of 300 MW is supplied by two 220 MW generators, for which the respective incremental fuel costs are $dC_1/dPg_1 = 0.1Pg_1 + 20$ and $dC_2/dPg_2 = 0.12Pg_2 + 15$, with power Pg in MW and costs C in Rs./hr. Determine (i) the most economical division of load between the generators and (ii) the saving in Rs./day thereby obtained, compared to equal load sharing between machines. **10**

Module – IV

17. a) What are the objectives of the reactive power control of generators ? **10**

b) Explain one Automatic Voltage regulator with neat sketch. **10**

OR

18. Derive the swing equation and clearly show the equal area criterion. **20**