Roll No											

PRESIDENCY UNIVERSITY
BENGALURU

SCHOOL OF ENGINEERING
END TERM EXAMINATION - JUN 2023

Semester : Semester VI - 2020
Course Code : EEE3002
Course Name : Sem VI - EEE3002 - Power System Analysis
Program : EAE&EEE

Date : 12-JUN-2023
Time : 9.30AM - 12.30PM
Max Marks : 100
Weightage : 50%

Instructions:
(i) Read all questions carefully and answer accordingly.
(ii) Question paper consists of 3 parts.
(iii) Scientific and non-programmable calculator are permitted.
(iv) Do not write any information on the question paper other than Roll Number.

PART A

ANSWER ALL THE QUESTIONS **(10 X 3 = 30M)**

1. The below list shows the various possible faults that may occur on a transmission line are;
a. 3-phase fault
b. L-L-G fault
c. L-L fault
d. L-G fault
List the decreasing order of severity of the fault from the stability point of view is. (CO4) [Knowledge]

2. Define power flow study or load flow study and mention the need of load flow analysis.
(CO2) [Knowledge]

3. What is the need for short circuit studies or fault analysis in power system?
(CO3) [Knowledge]

4. Define per unit value of any electrical quantity? Also list the advantages of per unit system.
(CO1) [Knowledge]

5. Define the following terms; a. Dynamic stability. b. Transient stability.
(CO4) [Knowledge]

6. What are symmetrical components? List the symmetrical components of three phase system.
(CO3) [Knowledge]

7. Define the Term Bus. Mention the advantages of bus admittance matrix.
(CO1) [Knowledge]

8. Give the expression for swing equation. Explain each term along with their units.
(CO4) [Knowledge]

9. List the quantities specified and the quantities to be determined from load flow study for various types of buses.

(CO2) [Knowledge]

10. List the need of Contingency analysis in Power system.

(CO5) [Knowledge]

PART B

ANSWER ALL THE QUESTIONS **(3 X 10 = 30M)**

11. Maintaining synchronism between the various elements of a power system has become an important task in power system operation as systems expand with the increasing interconnection of generating stations and load centres. The electromechanical dynamic behaviour of the prime mover-generator-excitation systems, various types of motors, and other types of loads with widely varying dynamic characteristics can be analysed through somewhat oversimplified methods for understanding the processes involved. Discuss the common assumptions made during transient stability studies.

(CO4) [Comprehension]

12. The information that follows demonstrates the proposed network for a power system connecting KGF and Bengaluru. Before actually activating the network, Mr. George would like to perform a load flow study on the power system network that is now being used. It is important to establish the SLD before carrying out the load flow analysis. Additionally, he must compute the per-unit value of the system components using the common base MVA and voltages. Electrical power system engineers will now be describing the process that must be followed in order to acquire the per-unit values of the system along with the required diagram.G1: 11 kV, 25 MVA, X''=10%.
M1: 11 kV, 20 MVA, X''=12%.
T2: 11kV/220 kV, 35 MVA, X=12%.
T2: 220kV/11 kV, 50 MVA, X=8%.
Line 220 kV, X=j40 ohm.
Choose 50 kV as the base voltage at the generator G1 and draw the per unit impedance diagram.

(CO1) [Comprehension]

13. Mr. Kiran would want to do a Contingency study on the network of the power system that is currently being utilised to transmit electricity from Mysuru to Bengaluru. In power systems, the contingency analysis simulates single failure events (such as the failure of a single line or a single unit) or multiple equipment failure events (such as the failure of several units or lines or their combination) one after the other until all "credible outages" are evaluated. Describe the method that must be followed in order to carry out the contingency plan, including the relevant flow chart.

(CO5) [Comprehension]

PART C

ANSWER ALL THE QUESTIONS **(2 X 20 = 40M)**

14. Obtain the load flow solution by using the GS method at the end of the first iteration of the given power system network by constructing the single line diagram and marking all the given parameters in SLD. Also compute the voltage at each bus.

Table No. 1: Line Data

Starting Bus	Ending Bus	Resistance in pu	Reactance in pu
1	2	0.05	0.15
1	4	0.10	0.30
2	3	0.15	0.45
2	4	0.10	0.30
3	4	0.05	0.15

Table No. 2: Bus Data

Bus Number	Pi in PU	Qi in pu	Vi
1	-	-	1.00
2	0.5	-0.2	-
3	-1.0	0.5	-
4	-0.3	-0.1	-

(CO2) [Application]

15. The 0.25 pu is the direct axis subtransient reactance of a generator with a rating of 20 MVA and 13.8 kV. It has a zero-sequence reactance of 0.1 pu and a negative-sequence reactance of 0.35 pu. The generator's neutral terminal has been connected to ground. When there is a single line-to-ground fault, estimate the fault current, the line-to-ground voltage, and the line-to-line voltages.

(CO3) [Application]