



B.E/B.TECH DEGREE EXAMINATIONS: APRIL /MAY 2024

(Regulation 2018)

Sixth Semester

ELECTRICAL AND ELECTRONICS ENGINEERING

U18EEI6203: Power System Analysis

COURSE OUTCOMES

- CO1:** Draw the reactance diagram for a given power system network and make load flow calculations.
- CO2:** Model the sequence networks in terms of symmetrical components.
- CO3:** Calculate the fault currents, voltages when symmetrical and unsymmetrical faults occur.
- CO4:** Analyze the stability of power system network using various methods.
- CO5:** Analyze load flow, fault and stability of power system network using simulation tool.

Time: Three Hours

Maximum Marks: 100

Answer all the Questions:-

PART A (10 x 2 = 20 Marks)

(Answer not more than 40 words)

- | | | |
|--|-----|-------------------|
| 1. Write the approximations made in reactance diagram. | CO1 | [K ₂] |
| 2. A generator rated at 30MVA, 11KV has a reactance of 20%. Calculate its per unit reactance for a base of 50 MVA and 10KV. | CO1 | [K ₃] |
| 3. Why the load flow study is needed in a power system? | CO2 | [K ₂] |
| 4. List the quantities specified and the quantities to be determined from load flow study for various types of buses. | CO2 | [K ₂] |
| 5. How symmetrical faults are analyzed? | CO3 | [K ₂] |
| 6. Mention the relative frequency of occurrence of various types of faults. | CO3 | [K ₃] |
| 7. What are the symmetrical components of a 3 phase system? | CO4 | [K ₂] |
| 8. When the zero sequence network will exist in the system? | CO4 | [K ₃] |
| 9. How power system stability is classified? | CO5 | [K ₂] |
| 10. In a 3 machine system having ratings G ₁ , G ₂ and G ₃ and inertia constants M ₁ , M ₂ and M ₃ . What is the inertia constants M and H of the equivalent system? | CO5 | [K ₃] |

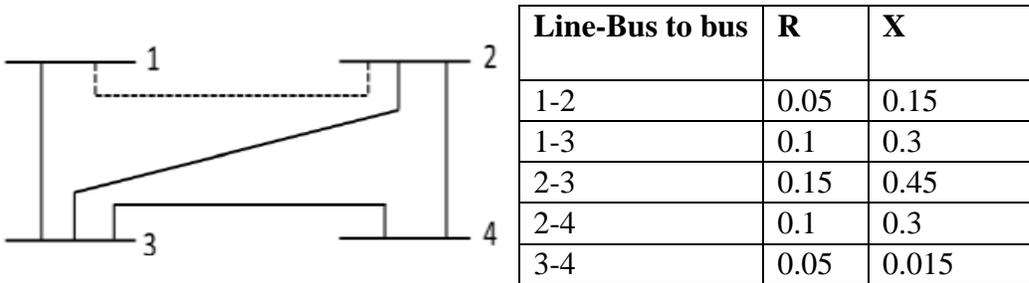
Answer any FIVE Questions:-
PART B (5 x 16 = 80 Marks)
(Answer not more than 400 words)

11. A 300 MVA, 20kV three phase generator has a subtransient reactance of 20%. The generator supplies two synchronous motors over a 64km transmission line having transformers at both ends as shown on the single line diagram. The ratings of the motors are: M1-200MVA, 13.2kV, $X''=20\%$; M2- 100MVA, 13.2kV, $X''=20\%$. The ratings of transformers are T1-350MVA, 230/20 kV, $X=10\%$; T2- composed of 3 single phase transformers each rated 127/13.2kV,100MVA, $X=10\%$. Series reactance of the transmission line is 0.5 ohm/km. Draw the reactance diagram with all reactance's marked in p.u. Select the generator ratings as base values. CO1 [K₃]

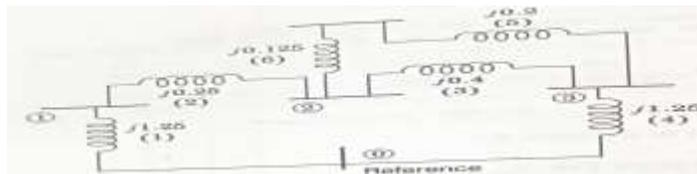


12. The figure shows the SLD of a simple four bus system. The table gives the line impedance identified by the buses on which these terminate. The shunt admittance at all the buses is assumed to be negligible. CO2 [K₃]

- a) Find YBUS, assuming that the line shown dotted is not connected.
 b) What modifications need to be carried out in YBUS if the line shown dotted is connected?



13. Formulate Z-bus for the network given below using Building algorithm. CO3 [K₃]



14. Derive and draw the connection of sequence network when a double line to ground fault occurs in an unloaded generator. CO4 [K₃]

15. Starting from the first principles, derive the swing equation of a power system consists of single machine connected to an infinite bus. CO5 [K₂]

16. a) Mention the two factors that affect the transient stability of a power system. Explain how these factors affect the transient stability. 8 CO4 [K₂]

- b) State and explain equal area criterion. 8 CO4 [K₂]
