C Total Pages **3**

Register No: ..... Name: .....

SAINTGITS COLLEGE OF ENGINEERING
KOTTAYAM, KERALA

(AN AUTONOMOUS COLLEGE AFFILIATED TO
APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

FIRST SEMESTER M.TECH. DEGREE EXAMINATION(R), MARCH 2021
(POWER SYSTEMS)

Course Code: 20EEPST105

Course Name: COMPUTER APPLICATIONS IN POWER SYSTEMS

Max. Marks: **60** **Duration:** **3 Hours**

PART A

(Answer all questions. Each question carries 3 marks)

1. Distinguish between bus frame of reference, loop frame of reference and branch frame of reference.
2. Explain the three-phase load flow.
3. Define the Table of factors with the help of an example.
4. Examine the effect of FACTS devices in load flow analysis.
5. List the assumptions made in short circuit studies
6. Derive the symmetrical component voltages E^{012} for a balanced phase voltages E^{abc}
7. Sketch the sequence network connection for a single line to ground fault
8. Explain the short circuit calculation using Z_{bus}

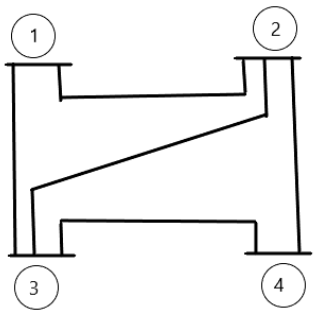
PART B

(Answer one full question from each module, each question carries 6 marks)

MODULE I

9. The single line diagram of a 4bus system is shown in figure. The data is given in table. Formulate the Y_{bus}

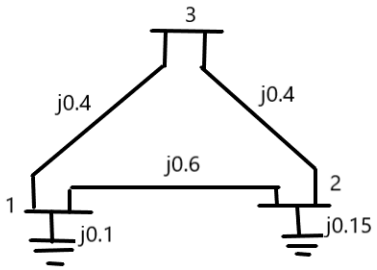
Line	R	X
1-2	0.05	0.15
1-3	0.1	0.3
2-3	0.15	0.45
2-4	0.10	0.30
3-4	0.05	0.15



(6)

OR

10. Construct the bus impedance matrix for the network shown in figure. All impedances are in pu.



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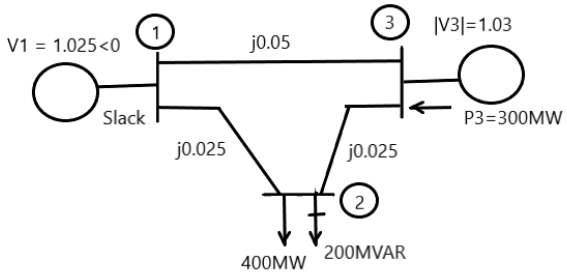
MODULE II

11. Figure shows the one-line diagram of a simple 3 bus power system with generation at buses 1 & 3. The voltage at bus 1 is V_1=1.025<0pu. Voltage magnitude at bus 3 is fixed at 1.03pu with a real power generation of 300MW. A load consisting of 400MW and 200MVAR is taken from bus 2. Line impedances are marked in pu on a 100MVA base. Using Gauss Seidel method and initial estimates of V_2^0=1.0+j0 and V_3^0=1.03+j0 and keeping|V_3|=1.03pu. Determine the phasor values of V_2 and V_3. Let $0.1 \leq Q_3 \leq 1$



(6)

OR

12. Explain in detail Newton Raphson method of load flow analysis (6)

MODULE III

13. Explain the representation of synchronous machine (6)

OR

14. Formulate an Optimal Power Flow problem with necessary constraints (6)

MODULE IV

15. Examine the effect of Thyristor Controlled Series Compensator (TCSC) in load flow analysis (6)

OR

16. Explain the changes to be made in the load flow analysis when Unified Power Flow Controller (UPFC) is incorporated in power system (6)

MODULE V

17. Explain the algorithm for calculating the system conditions after the occurrence of a line-to-line fault through Z_f (6)

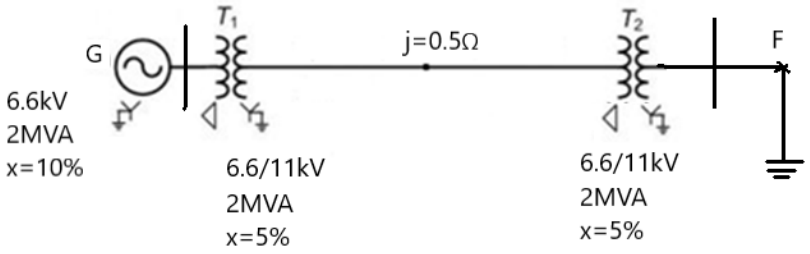
OR

18. A synchronous generator and a synchronous motor each rated 25MVA, 11kV having 15% subtransient reactance are connected through transformers and a line. The transformers are rated 25MVA, 11/66kV and 66/11kV with leakage reactance of 10% each. The line has a reactance of 10% on a base of 25MVA, 66kV. The motor is drawing 15MW at 0.8pf leading

and a terminal voltage of 10.6kV when a symmetrical 3 phase fault occurs at the motor terminals. Find the subtransient current in the generator, motor and fault. (6)

MODULE VI

19. Compute the fault current for an L-G fault at F for the power system shown in figure. The system is initially under no load. The generator negative sequence reactance is 70% of positive sequence reactance.



(6)

OR

20. Explain with neat sketches the double line to ground fault in power system (6)

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