BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)

CLASS: M.Tech.   SEMESTER : I
BRANCH: EEE   SESSION : MO/2023

SUBJECT: EE509 ADVANCED POWER SYSTEM ANALYSIS

TIME: 3 Hours   FULL MARKS: 50

INSTRUCTIONS:
1. The question paper contains 5 questions each of 10 marks and total 50 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
4. Before attempting the question paper, be sure that you have got the correct question paper.
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

		CO	BL

Q.1(a)   Discuss the modeling of synchronous generator and transmission line used in load flow?   [5]   1   2

Q.1(b)   A three phase generator feeds three large synchronous motors over a 16 km, 115 kV   [5]   1   3
transmission line, through transformer bank, as shown in Fig. Draw an equivalent single line
reactance diagram with all reactances indicated in per unit of a 100 MVA, 13.8 kV or 115 kV
base.
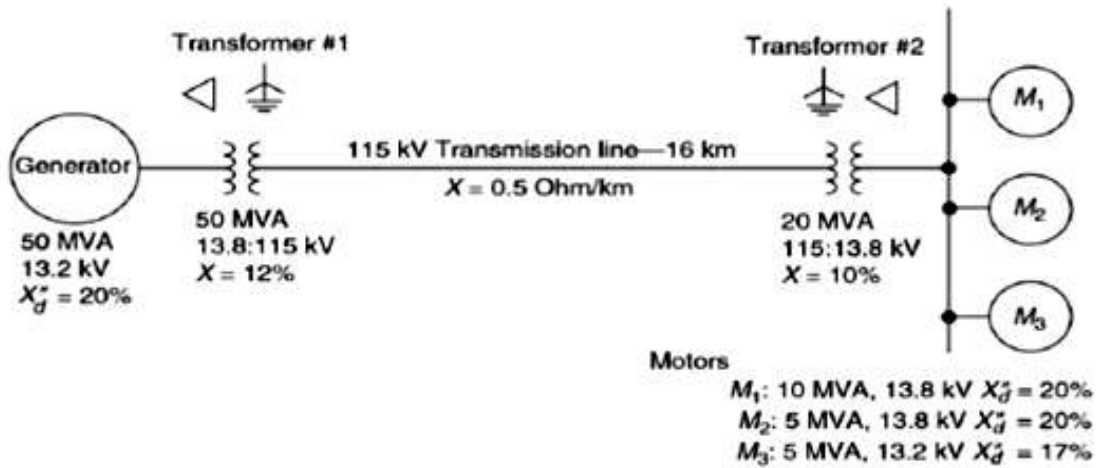
Q.2(a)   Develop the Load flow equations of PQ bus from the basic load flow equations required to   [5]   2   3
solve by Newton Raphson (NR) method

Q.2(b)   For a three-bus network carry out one iteration of load flow solution by NRLF method.   [5]   3   3

Line data	Line impedance (p.u)	Half line charging admittance (p.u)
1-2	0.021+j0.04	j0.006
2-3	0.013+j0.03	j0.002
1-3	0.016+j0.05	0

Bus Voltage: 1.0<0;   Bus2, Load: 50+j60;   Bus 3, Load: 40+j20. If required, take the proper
assumptions.

Q.3(a)   With the consideration of all the approximations, analyze the equations step by step as   [5]   3   4
required for load flow equations of Fast Decoupled Load Flow (FDLF).

Q.3(b)   Discuss the Sparsity oriented technique for reducing storage requirements with an example.   [5]   2   2

Q.4(a)   For a 2-bus network build Z_{Bus} matrix using Z_{Bus} building algorithm. Select branch numbers   [5]   3   3
appropriately.

Q.4(b)   Draw the sequence network and derive the fault current equation for double line to ground   [5]   3   4
fault appeared near the generator terminal.

Q.5(a)   What do you mean by Contingency Analysis? Explain the current shift distribution factor for   [5]   4   2
removing line overloading.

Q.5(b)   Why state estimation is required and evaluates state variables using weighted least square   [5]   5   2
estimate.

:::::24/11/2023 E:::::