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

CLASS: MTECH **SEMESTER : I**
BRANCH: EEE **SESSION : MO/2024**

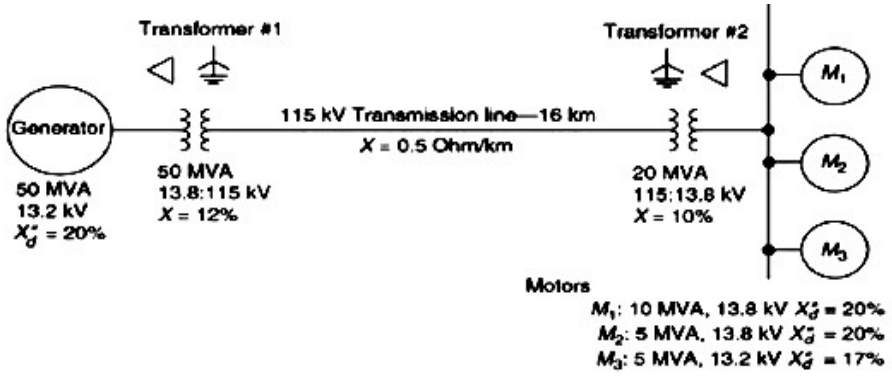
SUBJECT: EE509 ADVANCED POWER SYSTEM ANALYSIS

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 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.	[5]	1	3

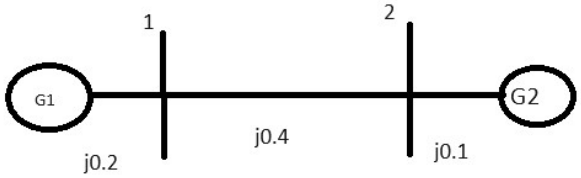


Q.2(a)	Develop the Load flow equations of PQ bus from the basic load flow equations required to solve by Newton Raphson (NR) method	[5]	2	3
Q.2(b)	For a three-bus network carry out one iteration of load flow solution by NRLF method.	[5]	3	3

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 required for load flow equations of Fast Decoupled Load Flow (FDLF).	[5]	3	4
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 appropriately.	[5]	3	3



Q.4(b)	Draw the sequence network and derive the fault current equation for double line to ground fault appeared near the generator terminal.	[5]	3	4
Q.5(a)	What do you mean by Contingency Analysis? Explain the current shift distribution factor for removing line overloading.	[5]	4	2
Q.5(b)	Why state estimation is required and evaluates state variables using weighted least square estimate.	[5]	5	2

::::::22/11/2024::::::E