Enrollment No._____

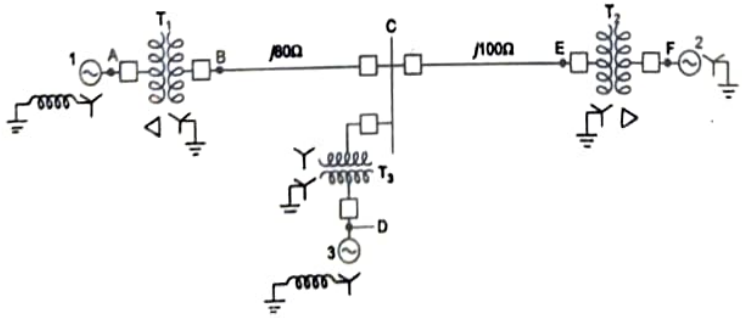
NAVRACHANA UNIVERSITY
a UGC recognized University

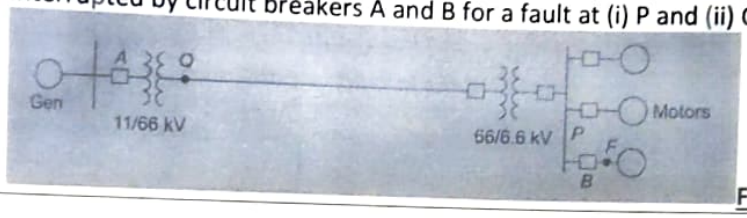
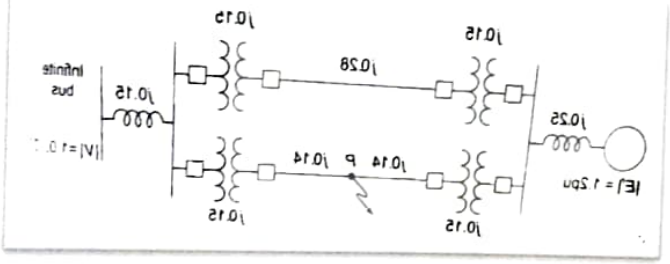
School: School of Engineering and Technology
Program/s: Electrical and Electronics Engineering
Year: 3rd **Semester:** 6th
Examination: End Semester Examination
Examination year: May - 2023

Course Code: EE 435 **Course Name:** **Electrical Power System II**
Date: 16/05/2023 **Total Marks:** 40
Time: 14:00 to 16:00 **Total Pages:** 2

Instructions:

- *Write each answer on a new page.*
- *Use of a calculator is permitted.*

Q. No.	Attempt Any Four:	Marks	COs*	BTL#
Q.1	A delta connected balanced resistive load is connected across an unbalanced three phase supply. With currents in line A as $10\angle 30^\circ$ and in line B as $15\angle -60^\circ$. Find the symmetrical components of line currents. Also find the symmetrical components of delta currents. Do you notice any relationship between symmetrical components of line and delta currents? Comments.	10	CO2	BT1, BT2, BT4, BT6
Q.2	The one-line diagram of an unloaded power system is shown in **Figure 2.** Reactance of the two sections of transmission line are shown on the diagram,  **Figure 2** The generators and transformers are rated as follows: Generator 1: 20 MVA, 13.8 kV, X= 0.2 pu Generator 2: 30 MVA, 18 kV, X= 0.2 pu Generator 3: 30 MVA, 20 kV, X= 0.2 pu Transformer T1: 25 MVA, 220Y/13.8Δ kV, X= 10%	10	CO2	BT1, BT2, BT4, BT6

	Transformer T2: Single phase units each rated 10 MVA,127/18 kV, X= 10% Transformer T3: 35 MVA, 220Y/22Y kV, X= 10% Draw the impedance diagram with all reactance marked in per unit and with letters to indicate points corresponding to the one-line diagram. Choose base of 50 MVA, 13.2 kV in the circuit of generator 1.			
Q.3	A 25 MVA, 11 kV generator with X_d'' = 20 % is connected through a transformer, line and a transformer to a bus that supplies three identical motors as shown in **Fig. 2**. Each motor has X_d'' = 25 % on a base of 5 MVA, 6.6 kV. The three-phase rating of the step-up transformer is 25 MVA, 11/66 kV with a leakage reactance of 10 % and that of step-down transformer is 25 MVA, 66/6.6 kV with a leakage reactance of 10%. The bus voltage at the motors is 6.6 kV. Find the symmetrical currents to be interrupted by circuit breakers A and B for a fault at (i) P and (ii) Q.  **Fig. 2.**	**10**	**CO2**	**BT1, BT2, BT4, BT6**
Q.4	Find the critical clearing angle for the system shown in **FIG. 3** for a three phase fault at point P. The generator is delivering 1.0 pu power under prefault conditions.  **FIG. 3**	**10**	**CO4**	**BT1, BT2, BT4, BT6**
Q.5	Three 6.6 kV, 3 phase 10 MVA alternators are connected to a common bus. Each alternator has a positive sequence reactance of 0.15 pu. The negative and zero sequence reactances are 75% and 30% of positive sequence reactance. A single line to ground fault occurs on the bus. Find the fault current if (a) all the alternator neutrals are solidly ground, (b) one neutral is solidly grounded and the other two neutrals are isolated, (c) one alternator neutral is grounded through 0.3 Ω resistance and the other two neutrals are isolated	**10**	**CO2**	**BT1, BT2, BT4, BT6**

**********End of Question Paper**********