Department of Electrical Engineering, Faculty of Engineering & Technology

Jamia Millia Islamia

I[st] Sessional Examination 2016, B.Tech, V[th] Semester

Power System-2, EES-505

Time:01 hour **MM: 30**

Note: Attempt All Questions

1. (a) Explain how buses are classified in a power system.

(b) What is the purpose of load flow analysis and what is the information obtained from it.

(c) What is ring main distribution system?

(d) What are the advantages of per unit system of representation?

(e) Discuss the effect of transmission voltage on line performance. Derive a formulae to support your answer.

2 (a) A distributor AB is fed from both the ends as shown in Fig 1. The loop resistance of the distributor is 0.5Ω/km. Calculate the minimum voltage and its location, and current in various section if the voltage at A and B are equal to 230 volts.

(b) The one line diagram of a three phase power system is shown in Fig 2. Select a common base of 100 MVA and 22 kV on the generator side. Draw an impedence diagram with all impedances marked in per unit. The manufacturer's data for each device is as given

G	90 MVA	22kV	X=18%
T1	50 MVA	22/220 kV	X=10%
T2	40 MVA	220/11 kV	X=6.0%
T3	40 MVA	22/110 kV	X=6.4%
T4	40 MVA	110/11 kV	X=8.0%
M	66.5 MVA	10.45 kV	X=18.5%

3. Fig 3 shows the one-line diagram of a simple four bus system. Table gives the line impedances identified by the buses on which these terminate. Find Y_{BUS} for the system.

Line (Bus to Bus)	R(pu)	X(pu)
1-2	0.05	0.15
1-3	0.10	0.30
2-3	0.15	0.45
2-4	0.10	0.30
3-4	0.05	0.15

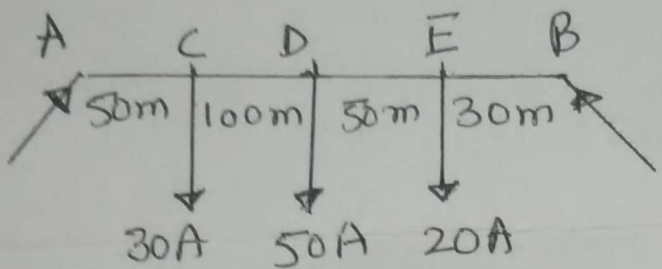

Fig 1

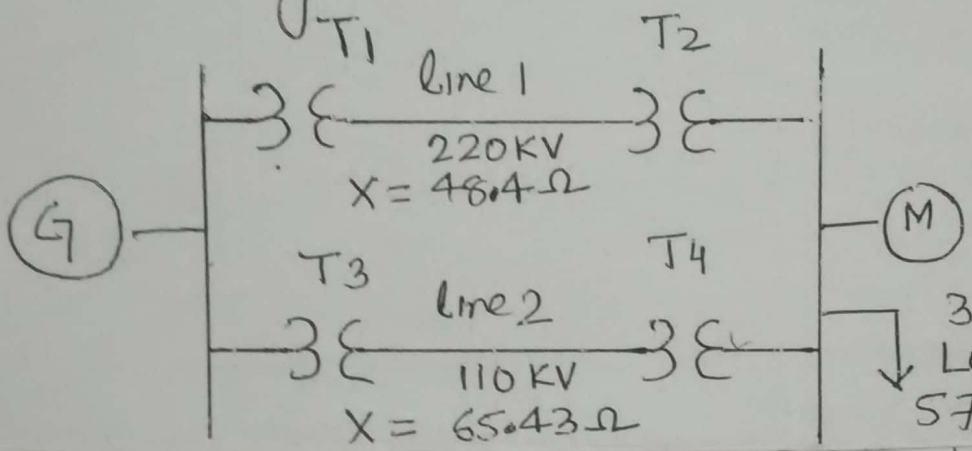

Fig 2

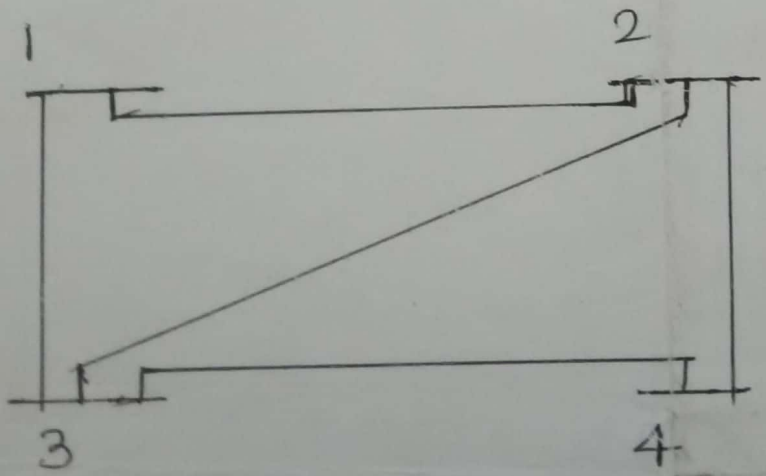

Fig 3

B. Tech Vth Semester 1st Sessional Examination(Electrical Engineering)

Department of Electrical Engineering

Jamia Millia Islamia

EES-505 Power System 2

Time One Hour **Maximum Marks: 30**

Note: i) Answer all questions.
ii) Only scientific **calculator** is allowed.

Question No.1: Answer the following questions (5 x 2)

I. Compare the AC and DC systems used in transmission and distribution.
II. What are the limitations of increasing the transmission voltage to a very high value.
III. What is slack bus. Why it is necessary in power system.
IV. What are the advantages of per unit system of representation.
V. What are the advantages of Y_{BUS} matrix.

Question No.2: The one line diagram of a three phase power system is shown in figure 1. Select a common base of 100 MVA and 22 kV on the generator side. Draw an impeence diagram with all impedences including the load impedence marked in per unit. The manufacture data for each device is given as follows:

G	90 MVA	22kV	X=18%
T1	50MVA	22/220kV	X=10%
T2	40MVA	220/11kV	X=6%
T3	40MVA	22/110kV	X=6.4%
T4	40MVA	110/11kV	X=8%
M	66.5MVA	10.45kV	X=18.5%

(1 x 10)

The three-phase load at bus 4 absorbs 57 MVA, 0.6 power factor lagging at 10.45 kV. Line 1 and Line 2 have reactances of 48.4 Ω and 65.43 Ω respectively.

Question No.3: Solve the following questions. (2 x 5)

I. What is the percentage saving in feeder copper if the line voltage in a two wire DC system be raised from 220 V to 400 V for the same power transmitted over same distance and having the same power loss.

II. For the Power system shown in Figure 2. Form Y_{BUS} Matrix.

P.T.O.

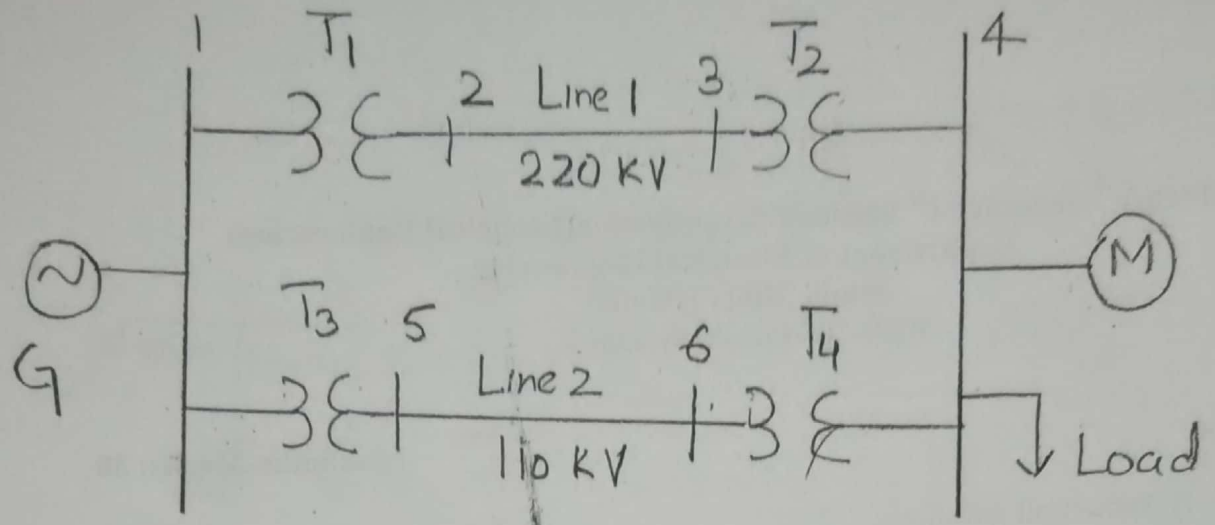

Figure 1

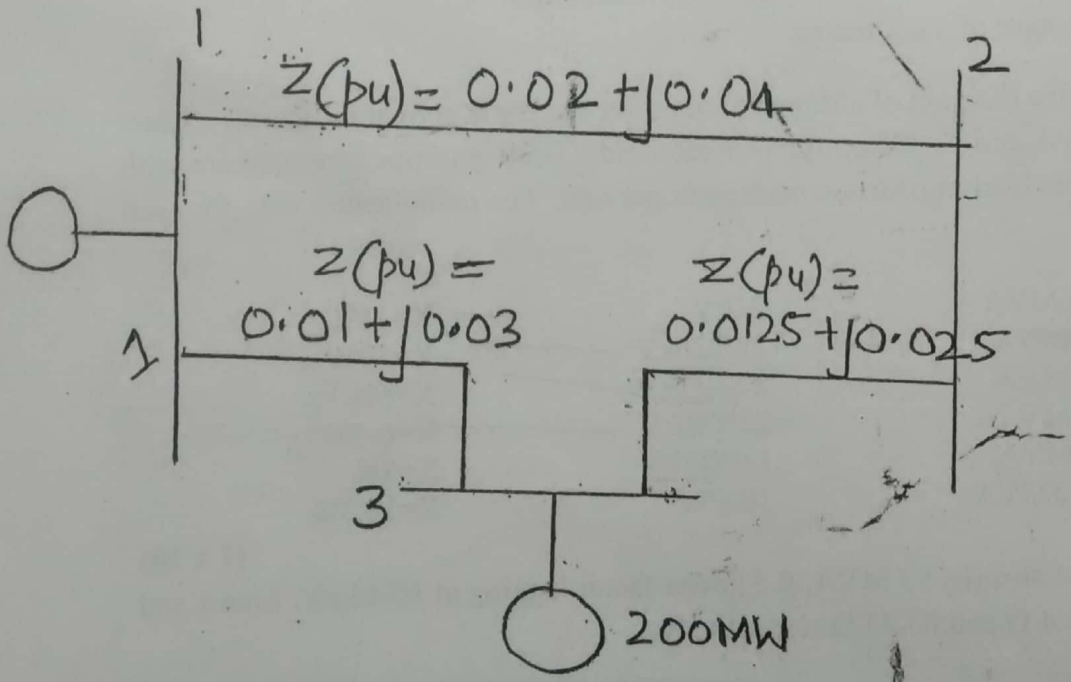

Figure 2

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2014

B. Tech in Electrical Engineering (V Semester)

First sessional test

EES 505 POWER SYSTEM II

Time: 1 Hour

Max. Marks 20

Answer all questions.

1. Draw the impedance diagram of the following network. Mark all the impedances in per unit. Use a base of 50 MVA, 220 kV in the 25Ω line. The parameters are as follows: Gen 40 MVA,25kV, X'=20%, Motor 50 MVA, 11kV, X''=30% Y-Y Transformer 40 MVA, 33/220kV, X=15%, Y-Δ Transformer 30 MVA, 11/220kV, X=15%

5+2

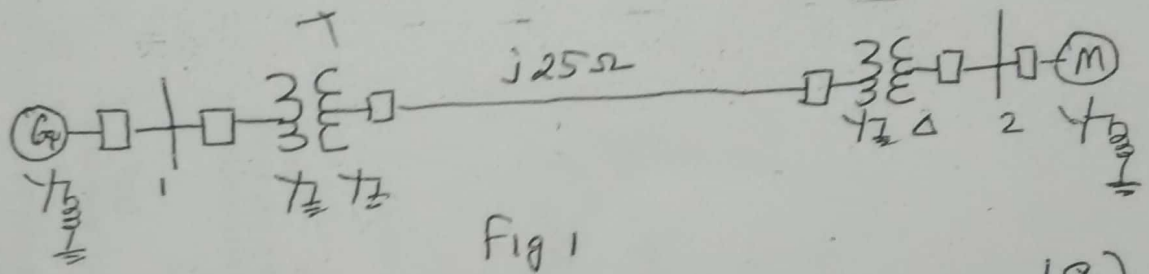


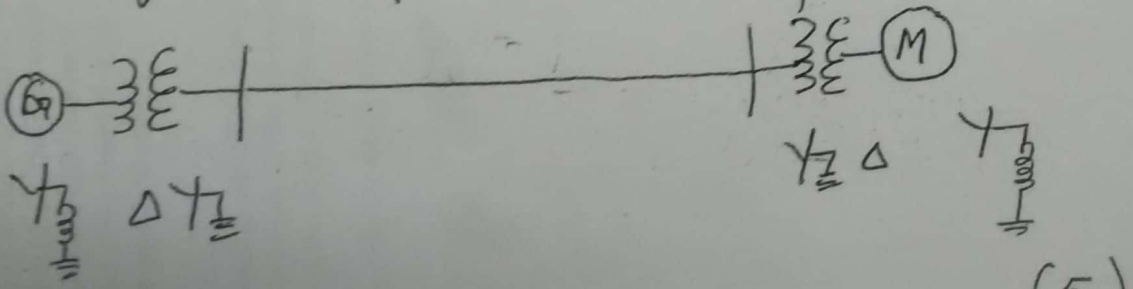
Fig 1

(8)

2. The currents flowing in the lines toward a balanced load connected in Delta are Ia= 10∠0°, Ib=141.4∠225° and Ic= 100∠90° A. Compute the symmetrical components of these line currents. Compute Iab1, the positive sequence current in the load. What will be the nature of the symmetrical components in the Delta connected load?

(7)

3. Draw the zero sequence network of the following power system. Label the zero sequence Imp. Correctly



(5)

EES - 505 (POWER SYSTEM II) Ist Sessional Test (05.09.13)

Time: One Hour Maximum Marks: 15

Question 1

Make a comparison of volume of conductor required for DC 2-wire system with one wire earthed (taken as reference), DC three-wire system, and three-phase, 3-wire star-connected system on the basis of equal maximum potential difference between any conductor and earth. (5)

Question 2

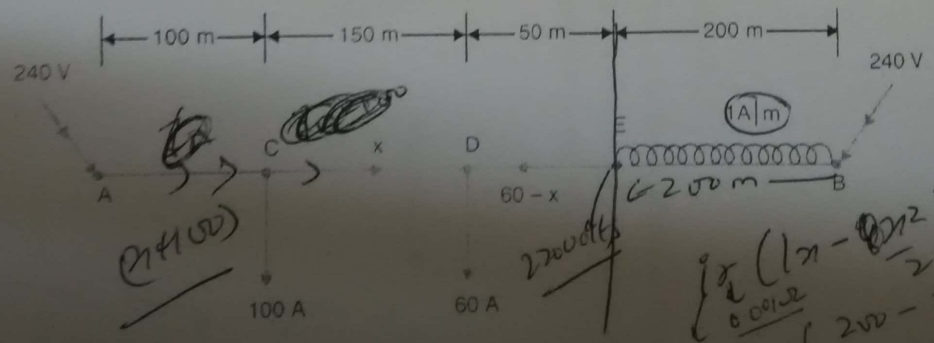
A dc ring main ABCDA is fed from point A from a 250 V supply and the resistances (including both lead and return) of various sections are as follows: AB = 0.02 Ω; BC = 0.018 Ω; CD = 0.025 Ω; and DA = 0.02 Ω. The main supplies loads of 150 A at B; 300 A at C and 250 A at D. Determine the voltage at each load point.

If the points A and C are linked through an interconnector of resistance 0.02 Ω, determine the new voltage at each load point. (10)

OR

Question 2'

A dc 2-wire distributor AB is 500 m long and is fed at both ends at 240 V. the distributor is loaded as shown in Figure 1. The resistance of the distributor (go and return) is 0.001 Ω per meter. Calculate (i) the point of minimum voltage and (ii) the value of this voltage. (10)



B. Tech (Electrical), V Semester, 2012

EES - 505 (POWER SYSTEM II) Ist Sessional Test (06.09.12)

Time: One Hour Maximum Marks: 15

Question 1

Derive an expression for the power loss in a uniformly loaded DC distributor fed at both ends with equal voltages. (5)

Question 2

Two conductors of a DC distributor cable AB, 1000 m long have a total resistance of 0.1 Ω. The ends A and B are fed at 240 V. The cable is uniformly loaded at 0.5 A per meter length and has concentrated loads of 120 A, 60 A, 100 A, and 40 A at points distant 200 m, 400 m, 700 m and 900 m respectively from the end A. calculate (i) the point of minimum potential (ii) currents supplied from ends A and B (iii) the value of minimum potential. (10)

Question 2'

Explain the factors, taken into considerations, while selecting the conductor size for an electrical line. How does the Kelvin's economy law help in it and what are the limitations of this law? (10)

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Q3. Derive the expression for current density $J = \frac{ne^2\tau}{m}E$ where n, electron density/m^3, τ is the relaxation time, E is the electric field, m is mass of electron with change 'e'. When 10 % pure copper material is added with pure aluminium what will happen to the conductivity of aluminium and why?

$V_m \sin\omega t = L\frac{di}{dt}$

$\frac{di}{dt} = \frac{V_m}{L}\sin\omega t$

$i = -\frac{V_m}{\omega L}\cos\omega t + C$

$0 = -\frac{V_m}{\omega L} + C$

$i = \frac{V_m}{\omega L}(1 - \cos\omega t)$

Ist Sessional Test, September 2010

B.Tech. (Electrical Engg.), Vth Semester

Subject:- POWER SYSTEMS-II, EES-505

Note:- Answer all questions.

MM=30
Time=60 min.

Q.1- What is the Kelvin's law about. Discuss its limitations. [06]

Q.2- A 200 m long distributor is fed from both the ends A and B at the same voltage of 250 volts. The concentrated loads of 50, 40, 30 and 25 are coming on the distributor at a distance of 50, 75, 100 and 150 m respectively from end A. Determine the minimum potential and locate its position. Also determine the current in each section of the distributor. Assume the resistance of the distributor conductor as 0.08 ohms per 100 meters for Go and Return. [08]

Q.3- Suggest a suitable strategy for the power transmission system employing both EHVAC and HVDC technology and list its advantages. [08]

Q.4- Draw the per unit reactance diagram for the system shown below in Fig. 1. The specifications of the components are given in the table-1. [08]

Table-1: Component Specifications

Generator G	Transformer T1	Transformer T2	Motor 1	Motor 2	Line
13.8 kV 25 MVA X'' =0.15 pu	13.2/69 kV 25 MVA X_t =0.11 pu	69/13.2 kV 25 MVA X_t =0.11 pu	13.0 kV 15 MVA X'' =0.15 pu	13.0 kV 10 MVA X'' =0.15 pu	X = 65 Ω

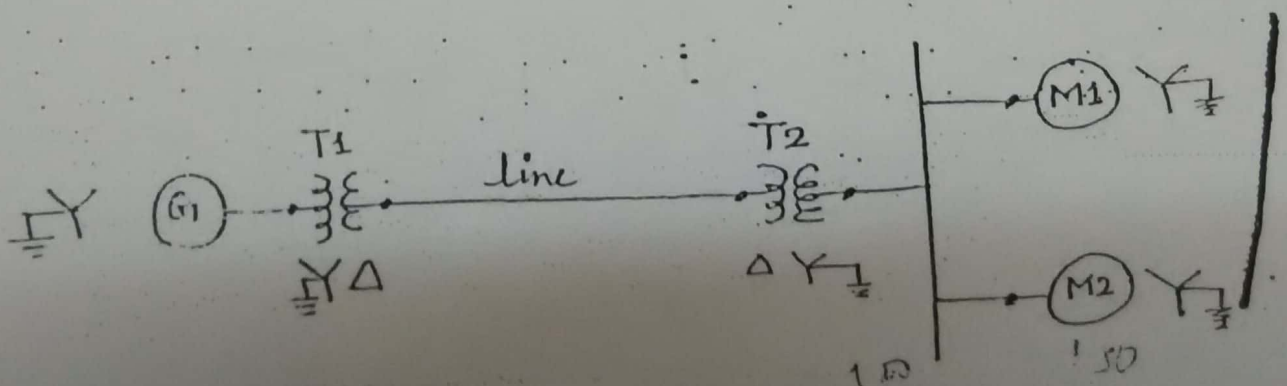


Fig. 1

Department of Electrical Engineering, Faculty of Engineering & Technology

Jamia Millia Islamia

2nd Sessional Examination 2016, B.Tech, Vth Semester

Power System-2, EES-505

MM: 30

Time:01 hour

Note: Attempt All Questions

1. (a) What is the function of CLR's in a power system. In what way they are classified

(b) What are Xd", Xd'and Xd, also compare their relative magnitudes.

(c) Compare NR and GS method for power flow solution.

(d) Draw the waveform of a symmetrical short circuit armature current in synchronous machine.

(e) Draw the waveform of a short circuit current on a transmission line.

2 (a) Draw and explain the circuit model of a three phase synchronous machine when a three takes place on its terminals when it is loaded.

(b) For the given figure 1 find the fault current in per unit and its actual vale also

3. For the radial network shown in Fig 2, athree phase fault occurs at F. Determine the fault current and the line voltage at 11 kV bus under the fault conditions.

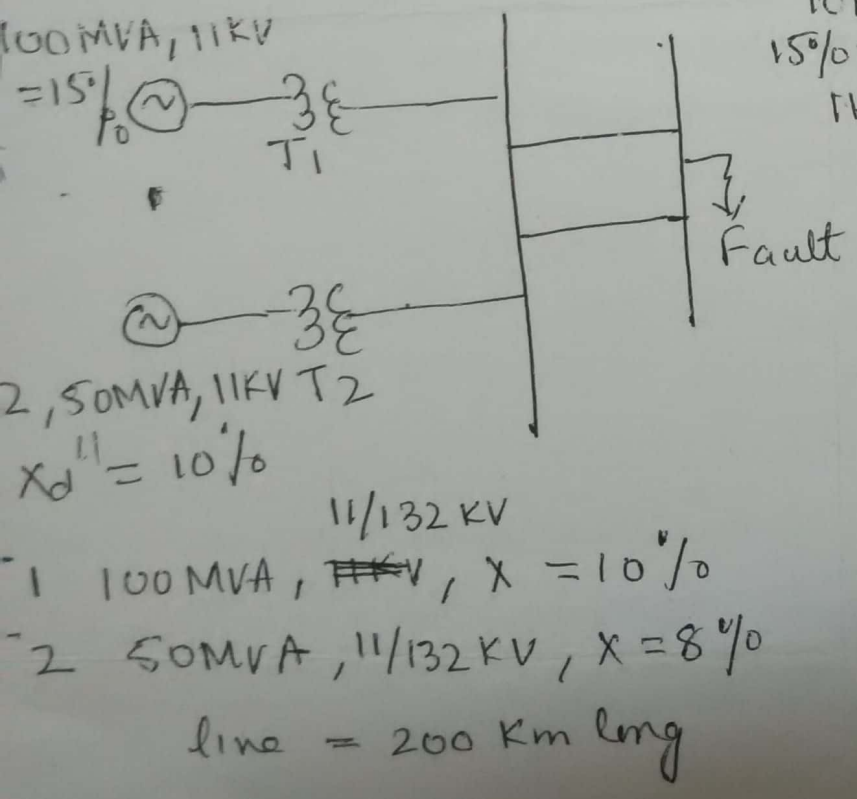


Fig 1

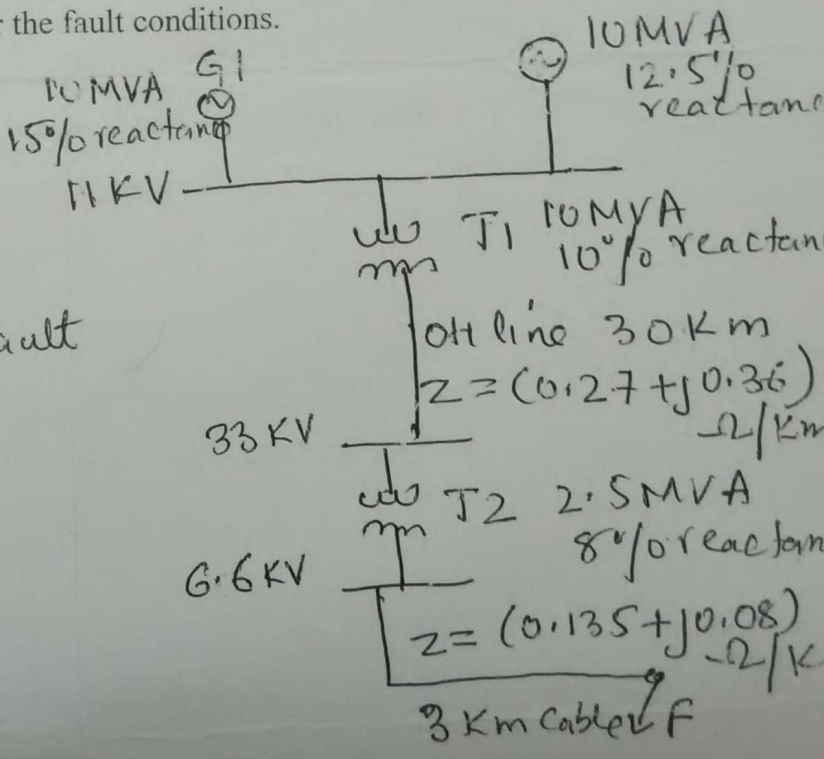


Fig 2

B. Tech Vth Semester 2nd Sessional Examination(Electrical Engineering)
Department of Electrical Engineering
Jamia Millia Islamia
EES-505 Power System 2

Time One Hour **Maximum Marks: 30**

Note: i) Answer all questions.
ii) Only scientific **calculator** is allowed.

Question No.1: Answer the following questions (5 x 2)

I. What is the importance of slack bus in power system and how it is selected
II. Classify the different types of buses in power system with the parameters specified at that particular bus
III. How many parameters are associated with each bus in power system, explain?
IV. Under which circumstances the generator bus in a power system is treated as a load bus.
V. What is the importance of using acceleration factor in GS method in load flow solution

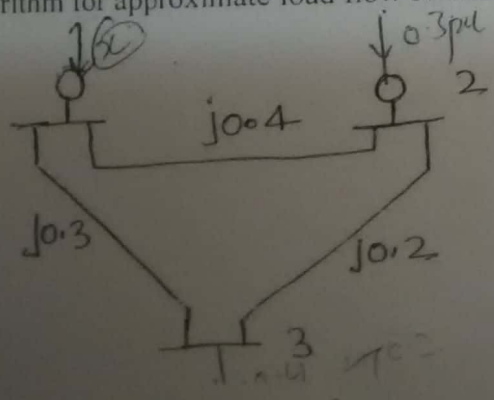
Question No.2: For the system shown in Figure and data given in Table determine the voltage at the end of first gauss seidel iteration. Assume MVA base as 100

Bus	Voltage	Generator		Load		Q_{min}	Q_{max}
		P	Q	P	Q		
1	$1.05\angle 0^0$	----	----	----	----	-----	----
2	1.02	0.3	----	-----	-----	-10	100
3	-----	----	----	0.4	0.2	---	---

(1 x 10)

Question No.3: Solve the following questions. (2 x 5)

I. For the system given in question 2 find the slack bus power
II. Write the algorithm for approximate load flow solution



B. Tech Vth Semester 2nd Sessional Examination(Electrical Engineering)
Department of Electrical Engineering
Jamia Millia Islamia
EES-505 Power System 2

Time One Hour **Maximum Marks: 30**

Note: i) Answer all questions.
ii) Only scientific **calculator** is allowed.

Question No.1: Answer the following questions **(5 x 2)**

I. For the Power System shown in Figure 1 , sketch the zero sequence network.
II. For a sudden short circuit on a transmission line draw its waveform.
III. Draw the waveform of symmetrical short circuit armature current in synchronous machine.
IV. State Fortescues theorem.
V. Compare Newton Raphson and GS power flow methods

Question No.2: Figure 2 shows a three bus power system.

Bus (1) Slack Bus V = 1.05 $\angle 0^0$ pu
Bus (2) PV bus V = 1.0 pu P_G = 3.0 pu
Bus (3) PQ bus P_L = 4 pu, Q_L = 2.0 pu

Carry out one iteration of power flow solution by GS method. Neglecting the limits on reactive power generation **(1 x 10)**

Question No.3: Solve the following questions. **(2 x 5)**

I. Write the algorithm for approximate load flow solution.

II. A 25 MVA, 11 KV three phase generatorhas a subtransient reactance of 20%. The generator supplies two motors over a transmission line with transformers at both ends as shown in figure 3. The motors have rated inputs of 15 and 7.5 MVA, both 10 kV with 25% subtransient reactance. The three phase transformers are both rated at 30 MVA, 10.8/121 kV connection delts-star with leakage reactance of 10% each.The series reactance of the line is 100 Ω. Draw the positive and negative sequence network of the system with reactances marked in PU.

Assume the the negative sequence reactance of the machine is equal to its subtransient reactance. Select generator rating as base in the generator circuit.

P.T.O.

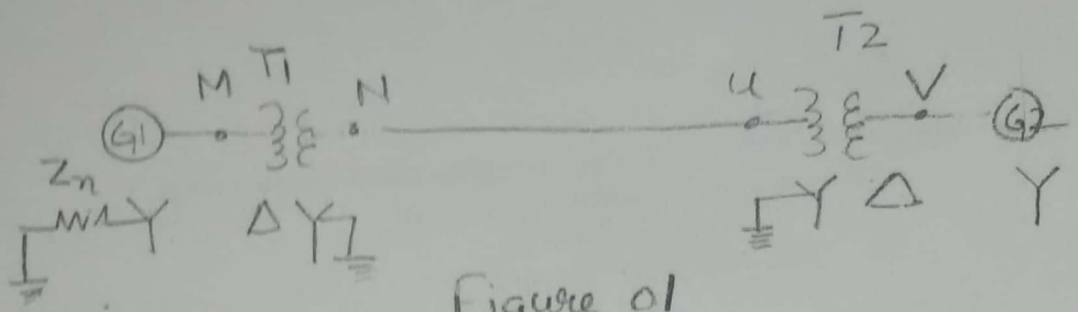


Figure 01

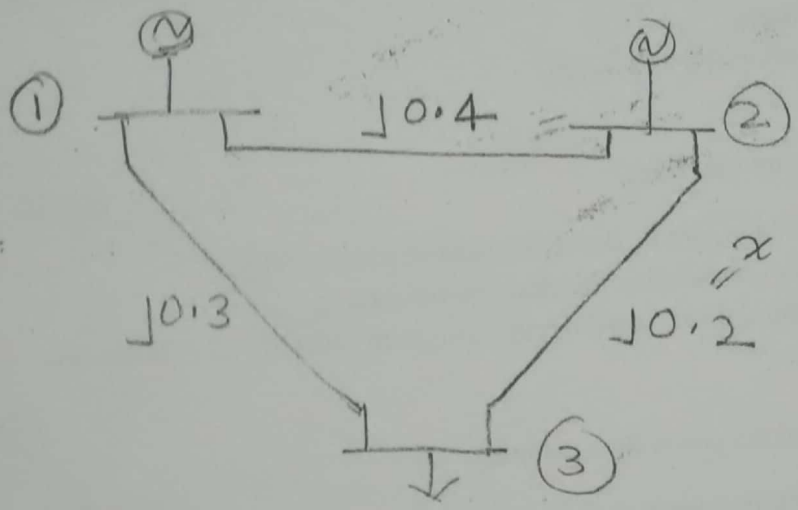


Figure (2)

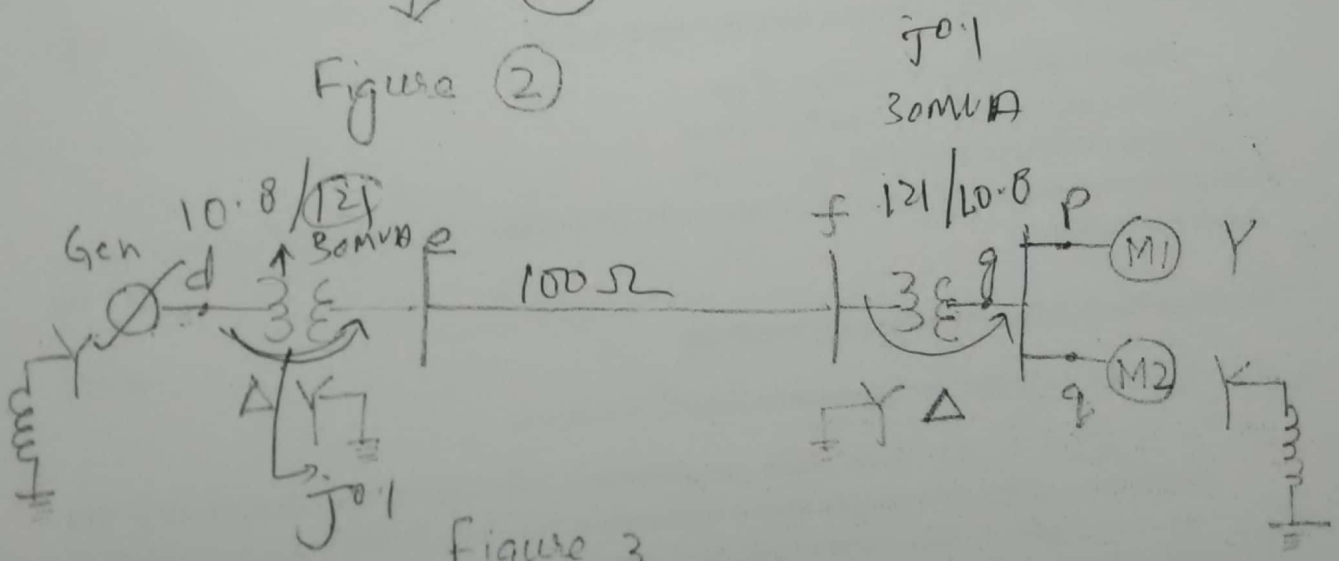


Figure 3

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B. Tech (Electrical), V Semester, 2012

EES - 505 (POWER SYSTEM II)

2nd Sessional Test

Time: One Hour

Maximum Marks: 15

Question 1

The resolution of a set of three-phase unbalanced voltages into symmetrical components gave the following results:

$$V_{a0} = 30\angle -30^0 \quad V, \qquad V_{a1} = 450\angle 0^0 \quad V, \qquad V_{a2} = 225\angle 40^0 \quad V$$

The component currents are

$$I_{a0} = 10\angle 190^0 \quad A, \qquad I_{a1} = 6\angle 20^0 \quad A, \qquad I_{a2} = 5\angle 50^0 \quad A$$

Determine the complex power represented by these voltages and currents by (i) symmetrical components (ii) unbalanced phase components. (5)

Question 2

Figure 1 shows the one-line diagram of a simple three-bus power system with generation at bus 1. The magnitude of voltage at bus 1 is adjusted to 1.05 per unit. The schedules loads at buses 2 and 3 are as marked on the diagram. Line impedances are marked in per unit on a 100-MVA base and the line charging susceptances are neglected. Using the Gauss-Seidel method, determine the phasor values of the voltage at the load buses 2 and 3 (P-Q buses); show the results after first two iterations only. (10)

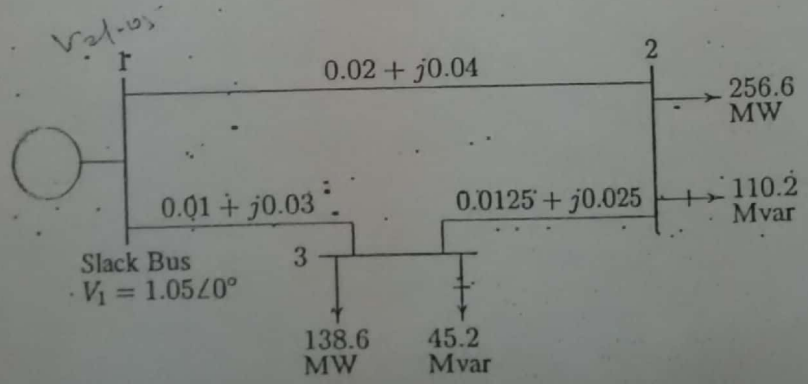

Figure 1

Question 3

What is meant by 'Fast Decoupled Load Flow Method'? Explain with the relevant expressions and highlights the approximations made in it. (10)