

JK LAKSHMIPAT UNIVERSITY, JAIPUR

INSTITUTE OF ENGINEERING AND TECHNOLOGY

End Term Examination (Regular/Backlog), April-May 2015

B. Tech in Electrical Engineering, Semester VI

Roll No.....

COURSE: EE 602 Power System Analysis

Time: 3 hours

Max. Marks: 100

Instructions to students:

1. Do not write anything other than your roll number on question paper.
2. Assume suitable data wherever required and mention it clearly.
3. Writing appropriate units, nomenclature, and drawing neat sketches/schematics/ flow chart wherever, required are an integral part of the answer.

Q.1	Objective type multiple choice questions (10 questions @ 1 mark)	10
i.	The per unit value of 2 ohm resistor at 100 MVA base and 10 KV base voltage is (a) 4 pu (b) 2 pu (c) 0.5 pu (d) 0.2 pu	
ii.	Fault level means (a) voltage at the point of fault (b) fault current (c) fault power factor (d) fault MVA	
iii.	The voltage source is un available in a)positive sequence (b)negative sequence c)zero &positive (d)zero &negative	
iv.	Which method uses small number of buses (a)Newton (b)Gauss seidal (c)Newton Raphson (d)none	
v.	The stability is improved by (a)increasing accelerating area (b)decreasing accelerating area (c)de-accelerating area (d)none of the above	
vi	Equal area criterion is used to study (a)resistivity (b)linear (c)stability (d)non linear	
vii	The real power depends on (a)power factor (b)power angle (c)power reactive (d)voltage	
viii	Bus admittance matrix is used in (a)load flow (b)power flow (c)load & power (d)none of the above	
ix	For a Synchronous Machine (a) positive sequence impedance and negative sequence is more than zero sequence impedances (b) positive, negative and zero sequence impedance are all equal (c) positive sequence impedance and negative sequence is less than zero sequence impedances d)none	

x	For a single line to fault the zero sequence current is given by $j3.0$ pu, The current carried by the neutral during the fault is (a) $j1.0$ pu (b) $j3.0$ pu (c) $j9.0$ pu (d) $j6.0$ pu	
Q.2	Short answer type questions (4 questions @ 2.5 marks)	10
i	Why the admittance matrix preferred for load flow study?	
ii	What is momentary current rating of circuit breaker? How it is estimated?	
iii	Define swing curve. What is the use of swing curve?	
iv	Write the basic concept of control area for load frequency control.	
Q.3A	What is per unit system? How are the base quantities are selected? Give advantages and disadvantages of per unit system.	05
Q.3B	Discuss the short circuit on a synchronous machine and design the different model of synchronous machine.	05
Q.4A	Discuss the principle of symmetrical components. Derive the necessary equation to convert a. Phase quantity in symmetrical components. b. Symmetrical components in phase quantities.	05
Q.4B	Explain the phase shift in star-delta Transformer.	05
Q.5A	Draw the positive, negative and zero sequence networks of Transmission Line.	05
Q.5B	Two generators rated 200MW and 400MW are operated in parallel. The droop characteristics of their governors are 4% and 5% respectively from their no load to full load. Assuming that the generators are operating at 50 Hz at no-load. How a load of 600 MW would be shared between them. Assume free governor operation.	05
Q.6A	What is equal area criterion? Discuss its application and limitation in the study of power system stability.	05
Q.6B	Discuss the different methods for improving steady state, dynamic and transient stability.	05
	OR	
Q.6B	Give reasons: (a) One of the buses is taken as slack bus in load flow study. (b) An acceleration factor is commonly use in load flow study.	05

Q.7A Explain the control of active and reactive power with suitable diagram. 05

Q.7B Explain the turbine speed governing system 05

OR

Q.7B A generator operating at 50 Hz deliver 1 pu power to an infinite bus through a transmission circuit in which resistance is ignored. A fault take place reducing the maximum power transferable to 0.5 pu whereas before the fault, this power was 2.0 pu and after the clearance of the fault, it is 1.5 pu. By the use of equal area criterion, determine the critical clearing angle. 05

Q.8 The parameters of a 4-bus system are as under: 15

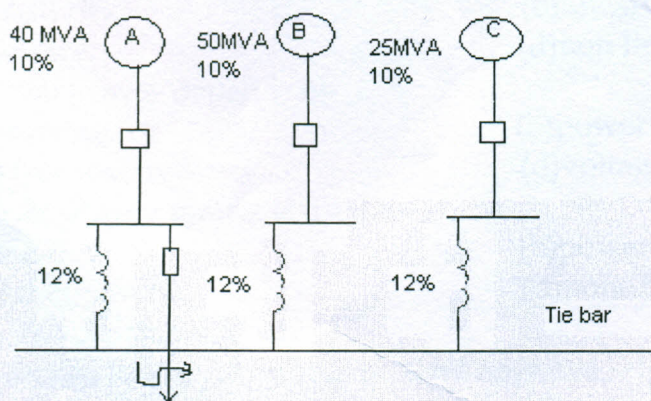
Bus Code	line Impedance(pu)	Charging Admittance(pu)
1-2	$0.2+j0.8$	$\frac{ypq}{2}$
2-3	$0.3+j0.9$	$j0.02$
2-4	$0.25+j1$	$j0.03$
3-4	$0.2+j0.8$	$j0.04$
1-3	$0.1+j0.4$	$j0.02$
		$j0.01$

Draw the network and find bus admittance matrix when

(a) The line between bus 1 to bus 4 is not present.

(b) The line between bus 1 to bus 4 is present with impedance $(0.1 + j 0.4)$ pu.

Q.9 Three 6.6 KV generators A, B, and C each of 10% leakage reactance and MVA ratings 40, 50 and 25 respectively electrically, as shown in figure by a tie bar through current limiting reactors. Each of 12% reactance based upon the rating of the machine to which it is connected. A three- phase feeder is supplied from the bus bar of generator A at a line voltage of 6.6 KV. The feeder has a resistance of 0.06ohm/phase and an inductive reactance of 0.12 ohm/phase. Estimate the maximum MVA that can be fed into a symmetrical short circuit at the far end of the feeder. 15

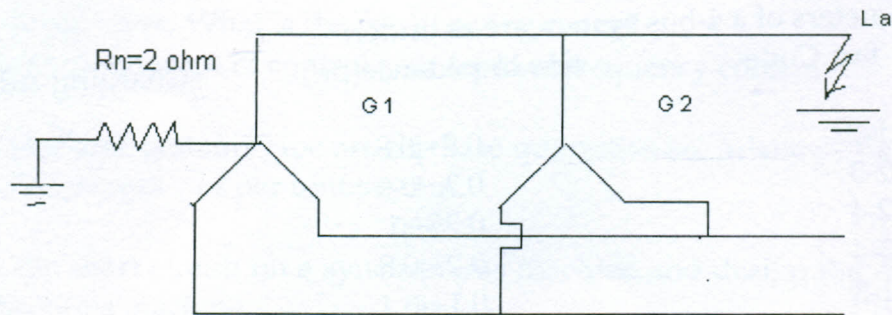


OR

Q.9 Two 11KV, 20MVA, three-phase, star connected generators operate in parallel as shown in fig. the positive, negative and zero sequence reactance of each being, 15

respectively $j0.18$, $j0.15$, $j0.10$ pu. The star point of one of the generator is isolated and that of the other is earthed through a 2.0 ohm resistor. A single line to ground fault occurs at the terminals of one of the generators. Estimate:

- The fault current, (b) Current in grounding resistor, and (c) The voltage across grounding resistor.



figure

