EE702

USN	1	M	S							

M S RAMAIAH INSTITUTE OF TECHNOLOGY

(AUTONOMOUS INSTITUTE, AFFILIATED TO VTU)

BANGALORE – 560 054

SEMESTER END EXAMINATIONS – JANUARY 2016

Course & Branch	**:**	**B.E.- Electrical & Electronics Engg.**	**Semester**	**:**	**VII**
Subject	**:**	**Power System -II**	**Max. Marks**	**:**	**100**
Subject Code	**:**	**EE702**	**Duration**	**:**	**3 Hrs**

Instructions to the Candidates:

- Answer one full question from each unit.

UNIT – I

1. a) What is the need of tap changing transformers in power system .Form Y-bus for the system shown in figQ1b Given Line-impedance=0.012+j0.152; Half Line charging admittance=j0.04 Transformer Impedance=j0.025 — CO1 (10)

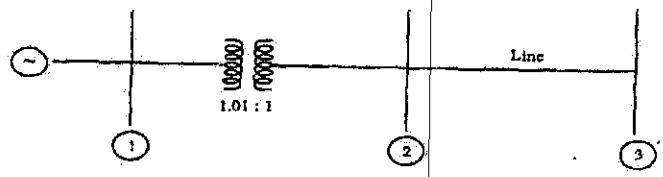


Fig1(a)

b) Using the bus building algorithm, form bus impedance matrix for the network shown in fig Q2b — CO1 (10)

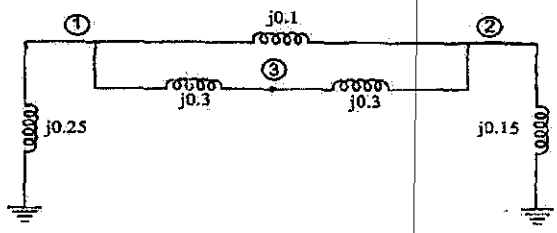


Fig.1(b)

2 a) Mention the advantages of obtaining Zbus using building algorithm. CO1 (10)

for a power system having

$$ZBus = j\begin{bmatrix} 0.08313 & 0.02530 & 0.05421 \\ 0.02530 & 0.11205 & 0.06868 \\ 0.05421 & 0.06868 & 0.26145 \end{bmatrix}$$

with a line of z= 0.6 PU connected between buses 1 and 2. If this line is replaced by a line of z= 0.4 PU. Find the new zbus and the change in 3 phase fault current at bus 2

b) Line data of the system is given below, obtain its Ybus using singular transformation — CO1 (10)

Bus code	1-2	1-3	2-3
Series Line impedance	J 0.4	J 0.2	J 0.5

UNIT – II

3. a) Use Newton-Raphson method to solve the equation CO2 (05)

$3x - \cos x - 1 = 0$, corrected to 4 decimal place

b) Three bus system has the following data CO2 (15)

Line data:			
Bus code	1-2	2-3	3-1
Z in PU	J0.133	J0.407	J0.3

Bus No	generation		load		Bus voltage	
	PG	QG	PL	QL	V	δ
1	--	--			1.05	0
2	0	0	0.7	0.8	--	--
3	0	0	0.5	0.2	--	--

Determine the voltages at buses 2 and 3 after Ist iteration using gauss-Siedel Method. Take acceleration factor as 1.6

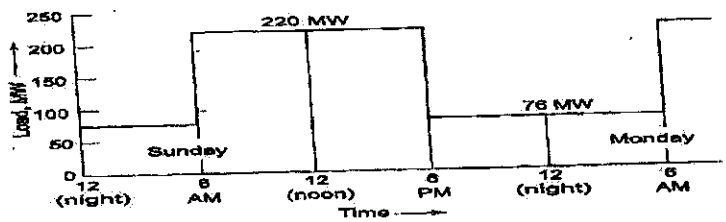
4. a) Compare Newton Raphson method of load flow analysis with gauss-Siedel method CO2 (05)

b) How are busses classified in load flow analysis . What is the need of slack bus? CO2 (05)

c) With flow chart and equations explain FDLF method of load flow analysis CO2 (10)

UNIT – III

5. a) CO3 (12)



FigQ5a

The cost equation are

$C_1 = 0.125P_2^2 + 30\ P_2 + 120$ Rs. /hr.

$C_2 = 0.1P_2^2 + 40\ P_2 + 100$ Rs. /hr.

Cost of Rs 400/- is incurred in taking either of the unit off the line and returning it to service .The maximum and minimum loads on each unit are to be 125 and 50 MW. Find whether it would be more economical to keep both the units in service for the 24 hours period or to remove one of the units from service for the 12 hours of light loads. Find the cost of generation in each case

b) A constant load of 300MW is supplied by two 200 MW generators, for which the incremental fuel costs are — CO3 (08)

$IFC_1 = 0.10P_{G1} + 20$ Rs /MW-hr.

$IFC_2 = 0.12P_{G2} + 15$Rs /MW-hr.

Determine the economic division of load between the generators machines, using iterative method

6. a) Calculate the loss formula coefficients of the system in pu. for the system shown in figQ6a.the branch currents and impedances are : — CO3 (12)

$I_a = 2\text{-}j0.5$ pu ; $Z_a = Z_b = 0.015+j0.06$ pu ;

$I_b = 1.6\text{-}j0.4$ pu ; $Z_c = Z_d = 0.01+j0.04$ pu ;

$I_c = 1\text{-}j0.25$ pu ; $I_d = 3.6\text{-}j0.9$ pu ;

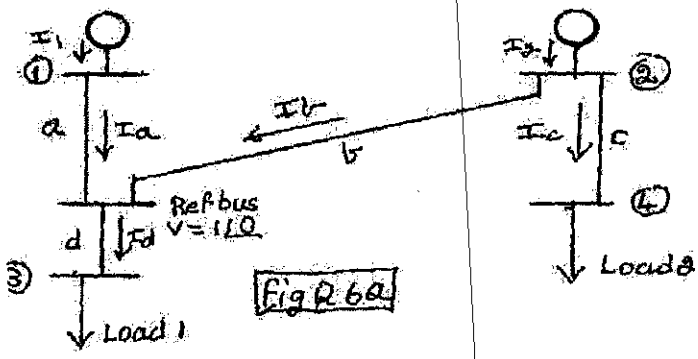


Fig Q 6a

b) For the previous problem 6a Calculate the transmission loss of the system using loss co-coefficient determined and verify the answer and comment on the result — CO3 (08)

UNIT – IV

7. a) A 50 MVA,50Hz generator delivers 50MW over a double circuit line to an infinite bus. The generator has an inertia H=2.7MJ/MVA. The transfer reactance before and during fault are 0.55PU and 1.8Pu respectively on a 50 MVA base. The voltage behind transient reactance of generator E=1.4PU, V=1 PU. If the critical clearing angle is around 104°, find the critical clearing time. — CO4 (10)

b) Explain Runge-kutta method of solving swing equation with flow chart and the required equations — CO4 (10)

8. a) With the help of flow chart, explain the method of finding the transient stability of a given power system using modified Euler's method — CO4 (10)

b) A generator operating at 50Hz delivers 1 PU power to an infinite bus through a transmission circuit in which resistance is ignored. A fault takes place reducing the maximum power transferable to 0.5 PU whereas before the fault, this power was 2 PU and after the clearance of fault, it is 1.5PU. Determine critical clearing angle — CO4 (05)

c) How are generators modeled for transient stability analysis — CO4 (05)

UNIT – V

9. a) Why voltage and frequency regulators are necessary in a power system. Explain the schematic diagram of a automatic regulator — CO5 (10)

b) Briefly explain the compensation techniques used in power system — CO5 (10)

10. a) Write the block diagram of automatic load frequency control and obtain the expression for change in frequency deviation caused by change in load demand — CO5 (10)

b) Two generators rated 200MW and 400MW are operating in parallel. The droop characteristics of their governors are 4% and 5% respectively from no load to full load. The speed changers are so set that the generators operate at 50Hz sharing the full load of 600MW in the ratio of their ratings. If the load reduces to 400MW, how will it be shared among the generators and what will be the system frequency. Assume free governor action. If the speed changer of the governor is reset so that the load of 400MW is shared among the generators at 50Hz in the ratio of their ratings, what are the no load frequencies of the generators ? — CO5 (10)

****