Sir M. Visvesvaraya Institute of Technology

(Approved by AICTE New Delhi, Affiliated to VTU, Belagavi, ISO 9001:2008 Certified)

Off International Airport Road, Krishnadevaraya Nagar, Bengaluru – 562157

ASSIGNMENT-II

DATE: 29 / 11 / 2022

COURSE/BRANCH:BE/ELECTRICAL & ELECTRONICS ENGINEERING   SEM :VII

SUBJECT: Power System Analysis 2   MAX.MARKS: 10

SUB.CODE:18EE71   SUBMISSION DATE: 08 /12/ 2022

MODULE : III & IV

Q. No	Questions	CO_s / POs	RBT
1	A power system consists of two buses(1&2) and a transmission line connected between 1-2. The series impedance of line is 0.04+j0.12pu with negligible line charging. The generation and load is given in the table. Slack bus voltage is 1+j0. Using NR method compute V_2 and δ_2 upto one iteration. (see table below)	CO2 /PO2	L5
2	For a three bus system with ground as reference, Y_{Bus} is given below (see matrix below) Bus 1 is slack with voltage (1.02+j0). The real and reactive power injections (in pu)at buses 2 and 3 (load buses) are P_2= -0.5; Q_2= -0.1;P_3= -0.3 and Q_3=0.0. Assuming 1+j0 pu voltage at buses 2 and 3, determine the elements of Jacobian sub-matrices J_1 and J_4.	CO2 /PO3	L5

3	There are two generators feeding a load bus with following incremental characteristics: IC_1=3+0.015P_1 and IC_2=2+0.018P_2
	 i) Find the economic schedule if total load is 160 MW. Assume no generator limits.
	 ii) Repeat the problem (i) with the following generation limits considered:
	  Unit-1: P_{max}=100MW, P_{min}=20 MW
	  Unit-2: P_{max}=100MW, P_{min}=10 MW
		CO3 /PO2	L4

4	The fuel inputs per hour of plant 1 and 2 are given as, F_1=0.2P_1^2+40 P_1+120 Rs.per hr F_2=0.25P_2^2+30 P_2+150 Rs.per hr Determine the economic operating schedule and the corresponding cost of generation, if the maximum and minimum loading on each unit is 100MW and 25MW. The demand is 180MW and transmission losses are neglected. If the load is equally shared by both the units, determine the saving obtained by loading the units as per equal incremental production cost.	CO3 /PO2	L3
5	A two bus system is shown in fig. If a load of 150MW is transmitted from plant 1 to the load, a loss of 20MW is incurred. Determine the generation schedule and load demand, if the cost of received power is Rs 25/MWhr. Solve the problem using co-ordination equation. The incremental production cost of the plants are, dF_1/dP_1=0.02P_1+15 and dF_2/dP_2=0.06P_2+20	CO3 /PO2	L3

Table for Q.1:

Bus No	Type	Generation (pu)		Load (pu)	
		Real	Reactive	Real	Reactive
1	Slack	-	-	-	-
2	PQ	-	-	0.6	0.2

Matrix for Q.2:

-j32	j10	0
j10	-j15	j5
0	j5	-j6

Load

6	Two plants generate power as given below, P_{G1}=50MW and P_{G2}=100MW respectively. If the loss co-efficients of the two plants are given as B_{11}=0.002, B_{22}=0.0015, B_{12}=-0.0011. What is the power loss on the transmission line.	CO3 /PO2	L3
7	Explain with flowchart and equation how the load flow analysis is carried out using NR method	CO2 /PO2	L3
8	The incremental cost in (Rs/MWhr) of two generator units are function of their respective powers P_1 and P_2 in MW are given by dC_1/dP_{G1}=0.2P_{G1}+50, 20MW $\leq P_{G1} \leq$150MW dC_2/dP_{G2}=0.24P_{G2}+40, 20MW $\leq P_{G2} \leq$150MW For certain load demand, P1 and P2 are chosen such that λ_1 =76 Rs/MWhr and λ_2 =68.8 Rs/MWhr. If the generations are rescheduled to minimize the total cost what must be the generation of P1 and P2.	CO3 /PO2	L4
9	Write a program to solve Q.No.2 and give the results.	CO2 /PO5	L4
10	Write the fuel cost equation and real power limits of any two thermal units situated in Southern or Northern region of Indian power system. Also find the incremental cost equation.	CO3 /PO1	L3

****