U.S.N.										

B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

October 2024 Supplementary Examinations

Programme: B.E.
Branch: Electrical and Electronics Engineering
Course Code: 22EE6PCCAP
Course: Computer Applications in Power Systems

Semester: VI
Duration: 3 hrs.
Max Marks: 100

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

		UNIT - I	*CO*	*PO*	Marks
1	a)	What is primitive network? Explain with circuit and equations the significance of it in both admittance and impedance forms.	*CO1*	*PO1*	**06**
	b)	Bus incidence matrix of 8- elements and 5- nodes system is given in Table 1(b). Obtain element node incidence matrix and oriented graph.	*CO1*	*PO1*	**06**

1	0	0	0	-1	0	0	1
0	0	0	1	0	0	-1	-1
0	1	0	0	1	1	0	0
0	0	1	0	0	-1	1	0

Table 1(b)

	c)	For a given network shown in Table 1. (c), Obtain Ybus by inspection method.	*CO4*	*PO4*	**08**

Element Number	Buses (p-q)	Zpq (pu)	Line charging admittance (Ysh) (pu)	Off-nominal turns ratio (a)
1	1-2	$0.2 - j0.6$	$j0.20$	--
2	1-3	$0.10 - j0.5$	$j0.50$	--
3	2-3	$0.15 - j0.3$	--	0.95
4	1-3	$0.25 - j0.15$	$j0.25$	--

Table 1.(c)

		UNIT - II			
2	a)	Obtain generalized algorithm equations for finding the elements of bus impedance matrix, when a branch element is added to its partial network.	*CO2*	*PO2*	**08**

b) For the netwok shown in figure 2(b). Form Ybus using singular transformation method. select ground as reference — *CO2* — *PO2* — **12**

Elements	Self-impedance	Mutual impedance
Gen A	j 0.25	
Gen B	j 0.25	
Gen C	j 0.25	
Line A-B	j 0.13	
Line B-C (N)	j 0.22	
Line B-C (S)	j 0.22	Line B-C (N) j0.48
Line C-D	j 0.11	

Table 2. (b).

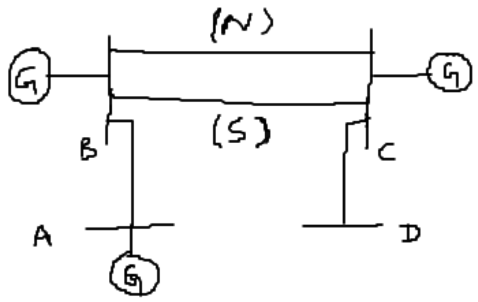


Figure 2. (b).

UNIT - III

3 a) Following is the data given for load flow solution. — *CO3* — *PO3* — **12**

Bus code	Admittance values in pu
1-2	$2 - j6$
1-3	$1 - j4$
2-3	$0.666 - j2.664$
2-4	$1 - j4$
3-4	$2 - j8$

Scheduled active and reactive powers are:

Bus code	Real power demand (MW)	Reactive power demand (MVAr)	Voltage (pu)
1	--	--	1.04
2	25	10	--
3	20	15	--
4	15	25	--

Determine the voltages at all buses at the end of first iteration using G.S method.

Consider α = 1.2. Base value as 50 MVA.

	b)	Derive an expression for load flow analysis for G.S. method. Also explain if PV bus is present in the network how it should be solved.	*CO2*	*PO2*	**08**
		OR			
4	a)	Discuss different types of buses in power systems. Explain the importance of reference bus.	*CO1*	*PO1*	**08**
	b)	Obtain bus voltages using GS load flow solution at the end of first iteration for the data shown in table 4 (b).	*CO4*	*PO4*	**12**

Line Data				Bus Data			
SB	EB	R (P.U)	X (P.U)	BUS NO.	P_i (P.U)	Q_i (P.U)	VTG (P.U)
1	2	0	0.1	1	--	--	1.0
1	3	0	0.2	2	5.32	--	1.1
2	3	0	0.2	3	3.64	0.53	--

Table 4 (b).

Given $0 \le Q_i \le 1.70$ pu

		UNIT - IV			
5	a)	With flow chart and assumptions explain the steps involved in FDLF method.	*CO2*	*PO2*	**08**
	b)	For a power system shown in Fig 5(b) obtain jacobian elements.	*CO4*	*PO4*	**12**

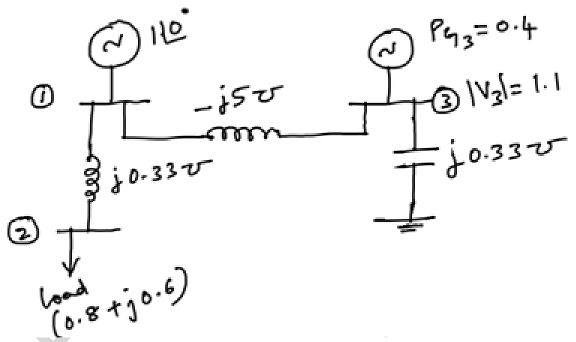
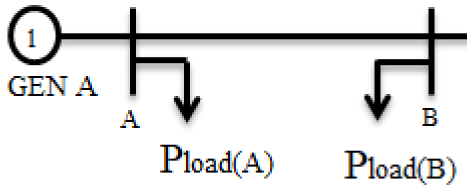
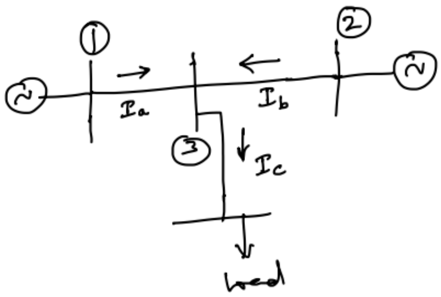


Fig 5(b)

		UNIT - V			
6	a)	Derive an expression for B co-efficients for a two generator system.in economic operations of power systems.	*CO5*	*PO2*	**08**
	b)	A two bus system, without generator limits, has been considered as shown in fig. 6 (b), where $P_{load\,(A)} = 400\ MW,$ $P_{load\,(B)} = 100\ MW\ and$ $P_{loss} = 0.08(P_{G(A)}) + 10$ $(IFC)_A = 0.06\,P_{G(A)} + 4.0\ Rs/MWh$ $(IFC)_B = 0.07\,P_{G(b)} + 4.0\ Rs/MWh$ Find the optimal generator scheduling for each plant, total power loss and system incremental cost.	*CO5*	*PO3*	**12**

			 Fig. 6 (b)			
			OR			
	7	a)	Derive an expression for penalty factor in economic operations of power systems including losses.	*CO5*	*PO2*	**08**
		b)	Obtain B coefficients for the system shown in fig 7 (b) $I_a = 1\angle 0^0\ pu$ $Z_a = 0.05 + j0.10\ pu$ $I_b = 0.8\angle 0^0\ pu$ $Z_b = 0.05 + j0.10\ pu$ $I_c = 2\angle 0^0\ pu$ $Z_c = 0.01 + j0.10\ pu$ Take $V_3 = 1\angle 0^0\ pu$  Fig 7(b)	*CO5*	*PO3*	**12**

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