Code No: 156CK **R18**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech III Year II Semester Examinations, August/September - 2021
POWER SYSTEM OPERATION AND CONTROL
(Electrical and Electronics Engineering)

Time: 3 Hours **Max. Marks: 75**

Answer any five questions
All questions carry equal marks

- - -

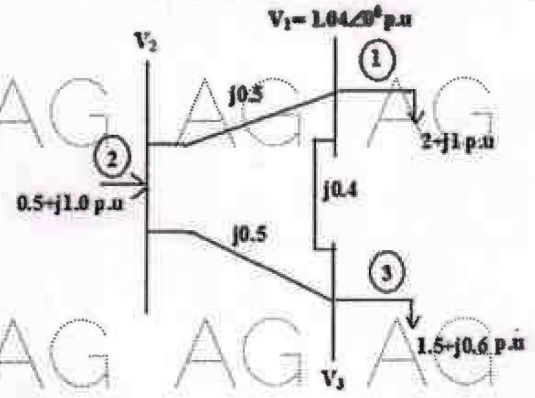
1.a) Explain the need for slack bus in load flow analysis.

b) For the three bus system whose Y_{bus} is given below, calculate the second iteration value of V3 using the Gauss-Seidel method. Assume bus 1 as the slack (with V1 = 1.0/0), and buses 2 and 3 are load buses with a per unit load of (S2 = 1 + j0.5) and (S3 = 1.5 + j0.75). Use voltage guesses of 1.0/0 at both buses 2 and 3. The bus admittance matrix for a three-bus system is

$$Y_{BUS} = \begin{bmatrix} -j10 & j5 & j5 \\ j5 & -j10 & j5 \\ j5 & j5 & -j10 \end{bmatrix}$$

[5+10]

2. A sample power system is shown in diagram. Determine V_2 and V_3 by N.R. method after one iteration. The P.U. values of line Impedances are shown in figure. [15]



3. Develop an iterative algorithm for solving the optimum dispatch equation of an 'n' bus power system by taking into account the effects of system losses. [15]

4. The fuel cost functions in Rs/hr for two thermal plants are given by:

$$C1=420+9.2P1+0.004\,P_1^2$$
$$C2=350+98.5P2+0.0029\,P_2^2P$$

Where P1, P2 are in MW? Determine the optimal scheduling of generation if the total load is 640.82 MW. Estimate value of λ=12Rs/MWh. The transmission power loss is given by the expression $PRL(pu)R=0.0346\,P_1^2+0.00643P_2^2$. [15]

5. Draw the block diagram of a two area system and prove that the integral control reduces the static error in frequency and the line power flow to zero. [15]

6.a) Explain the effects of regulation and dead band on speed governor and automatic generation control.

b) Two alternators rated for 110 MW and 210 MW have a governor droop characteristic of 5% from no load to full load. They are connected in parallel to share a load of 250MW. Determine the load shared by them. Assume free governor operation. [8+7]

7.a) Differentiate between steady state and transient stability of a power system. Discuss the factors that affect them.

b) Explain the step by step method of solving the swing equation. Compare it with equal area criterion method. [7+8]

8. Explain the hardware components and functional aspects of SCADA system using a fundamental block diagram. [15]

---ooOoo---