1T00837 - B.E.(Electrical Engineering)(SEM-VII)(Choice Base Credit Grading System ) (R- 19) ('C' Scheme) / 42272 - Electrical Power System III
QP CODE: 10028215 DATE: 16/06/2023

**(3 Hours)** **80 Marks**

**NOTE**

1.Question number 1 is compulsory
2.Attempt any three from the remaining
3.Figures to right indicates full marks
4.Assume suitable data if necessary and mention the same

1. Attempt any four of the following :- **20**

a) Explain why frequency control loop and voltage control loop are not interacting **05**

b) For following $Y_{BUS}$ fill in the blanks, all $y_{i0} = 0$ **05**

$$j\begin{bmatrix} -13 & 10 & 5 & - \\ - & -18 & 10 & - \\ - & - & -13 & - \\ - & - & - & - \end{bmatrix}$$

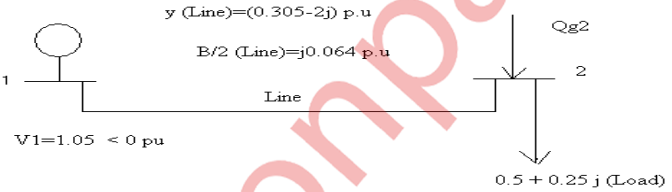
c) Define power system stability and classify it on the basis of nature of disturbance **05**

d) State assumptions made in transient stability studies **05**

e) In turbine speed governor system ΔPc is unit step ,Δf =0, R=2.5, Ksg=1,Tsg=0.4, Determine ΔYE at t=0.2 s **05**

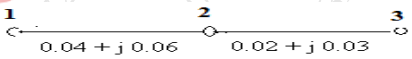
2. **20**

a) A simple two-bus power system is shown in fig **10**




$|V_2|$ =1.0 p.u (Bus 2 is PV bus). Obtain $\delta_2$ and $Q_{g2}$ at the end of first iteration of N-R method.

b) For the network shown in figure obtain the complex bus bar voltage at bus 2 at the end of the first iteration. Use the Gauss seidal method. Line impedances are given in pu Given Bus 1 is slack bus with $V_1 = 1 < 0$ **10**
$P_2 + j\,Q_2 = -5.6 + j\,1.46$ Assume $V_3^0 = 1.02 < 0$ $V_2^0 = 1 < 0$




3. **20**

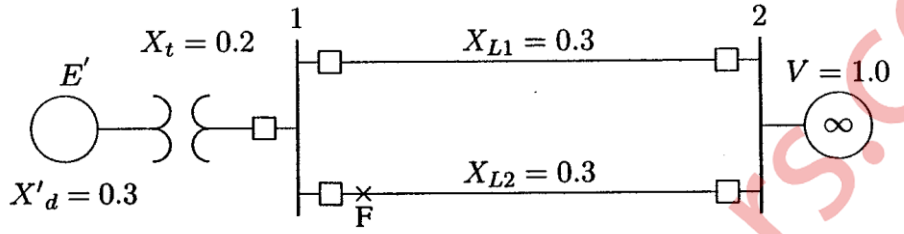
a) Determine the economic operation point for three thermal units delivering a total load of 600 MW with considering generator limit **10**
Unit1 Pmax=600 MW; Pmin=150 MW
$F1(P_1)=550+7.7P_1+0.00165P_1^2$
Unit2 Pmax=500 MW; Pmin=125 MW
$F2(P_2)=300+7.88P_2+0.002P_2^2$
Unit3 Pmax=600 MW; Pmin=75 MW
$F3(P_3)=80+7.99P_3+0.005P_3^2$

b) Derive formula for Bmn coefficients in transmission loss formula **10**

4. **20**

a) Find the steady state power limit of a system consisting of a generator equivalent reactance 0.5 p.u connected to an infinite bus through a series reactance of 1.0 p.u. The terminal voltage of the generator is held at 1.2 p.u and the voltage of the infinite bus is 1 p.u **10**

b) A 50 Hz synchronous generator having inertia constant H=5 MJ/MVA and a direct axis transient reactance xd' = 0.3 p.u is connected to an infinite bus through a purely reactive circuit as shown in the figure below. Reactances are marked on the diagram on a common system base. The generator is delivering real power Pe=0.8 pu and Q=0.074 pu to the infinite bus at voltage v=1 pu. A temporary three phase fault occurs at the sending end of the line at point F. When the fault is cleared, both the lines are intact. Determine the critical clearing angle and the critical clearing time **10**




5. **20**

a) Draw turbine speed governor system and explain briefly 4 major parts in it **10**

b) Explain dynamic response of change in frequency for step change in load of an isolated power system. How dynamic response changes with integral control action **10**

6. Write short notes on **20**

a) power pool and its advantages and disadvantages **10**

b) System state classification of power system security **10**