BEET- 502 Power Systems- II
Course Outcomes:

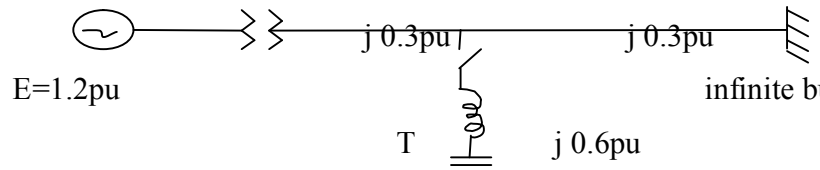
CO1: Create computational models for analysis power systems and able to understand per unit system.

CO2: Analyse a power system network under Symmetrical Conditions to discriminate Positive Sequence, Negative & zero sequence system.

CO3: Evaluate load flow computations for an interconnected power system.
CO4: Illustrate power system operation and transient control.
CO5: Test the stability control of a power system.

Model Question Paper

Q No.	Question	M
1a.	What do you understand by one line diagram? What is the difference between one line diagram and impedance diagram? Explain with the help of examples.	
1b.	Discuss per unit system with advantage and Drawback. Explain the per unit representation of the Transformer.	
1.c	Discuss the different kinds of the faults occurring under unloaded condition of synchronous generator.	
2.a	A synchronous generator is rated 25MVA, 11 kv. It is star connected with the neutral point solidly grounded. The generator is operating at no load rated voltage. Its reactances are X"=X_2=0.20 pu and X_0 = 0.08pu. calculate the symmetrical sub transient line currents for (i) Single line to ground fault (ii) Double line to ground fault (iii) Double line fault (iv) Symmetrical three phase fault Compare these currents and comment.	
2.b	Explain surge impedance and velocity of propagation of travelling wave. Show that the velocity of a travelling wave can be given by $v = \frac{1}{\sqrt{Lc}}$.	
3.a	What is Bewley's Lattice Diagram? Describe Advantages of Bewley's Lattice Diagrams.	
3.b	Derive Gauss Seidel Algorithm for power flow analysis Also comparison between G-S and N-R method of power flow solution?	
3.c	A loss free generator supplies 50 MW to an infinite bus, the steady-state limit of the system being 100 MW. Determine whether the generator will remain in synchronism if the prime mover input is abruptly increased by 30 MW.	
4.a	A system has Sbase = 100 MVA, calculate the base current for a) Vbase = 230 kV b) Vbase = 525 kV Then using this value, calculate the actual line current and phase voltage where I =95.4 pu, and V	

	=5.0pu at both 230 kV and 525 kV.
4.b	3 substations A, B and C are spaced 75 km apart as shown in figure 4.10. B and C are connected together by a cable (velocity of propagation 2 x 10^8 m/s), and the remaining connections are all overhead lines (velocity of propagation 3 x 10^8 m/s). The attenuation factors and the surge impedances of the lines are shown alongside the lines. The overhead lines beyond A and C on either side are extremely long and reflections need not be considered from their far ends. Determine using the Bewley lattice diagram the overvoltages at the 3 substations, at an instant 1_ ms after a voltage surge of magnitude unity and duration ¾ reaches the substation A from the outside.
5.a	Discuss the classification of the busses for the power flow analysis. What is $\mathbf{Y_{bus}}$**?** Explain the development of the power flow equation.
5.b	Discuss the different kinds of the faults occurring under unloaded condition of synchronous generator.
5.c	Explain the computational procedure for the load flow solution using Gauss Siedel method, when the system contains all three buses.
6.a	Discuss protection of the equipments and line against travelling waves. Explain the term travelling wave and standing wave as applied to transmission lines. Two long transmission line such having surge impedance of 400Ω are connected by a cable having surge impedance of 50Ω. If short pulses have magnitude 10 kv travel along the first line towards the junction. Determine from first principles the magnitude of the first and second pulses entering the second lin. Stay any assumption made.
6.b	What is Newton Raphson Method, explain procedure and draw Flowchart For Newton Raphson Method with advantages.
7.a	Write a short note on the following (i) Synchronous machine (ii) Transmission line
7.b	Explain what is meant by the surge impedance of a transmission line and derive its value in terms of the line constants.
7.c	Derive Gauss Seidel Algorithm for power flow analysis Also comparison between G-S and N-R method of power flow solution?
8.a	Discuss the steady state stability using swing equation of a machine connected with infinite bus. For the system shown in fig.2 an inductor of reactance 0.6pu per phase is connected in at the midpoint of transmission line. Determine the steady power limit under the following condition  fig .1 (i) With inductor switch S is open

	(ii) With inductor switch S is closed (iii) With inductor replaced by a capacitor of the same per unit reactance.	
8.b	Discuss the point by point method for solving swing equation for transient stability of a power system	**8**