

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-V • EXAMINATION – WINTER 2013****Subject Code: 150902****Date: 29-11-2013****Subject Name: Power System Analysis and Simulation****Time: 10.30 am - 01.00 pm****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) Derive expression of current when there is a sudden three phase short circuit at the other end of unloaded transmission line. Assume a constant voltage source is connected at sending end and neglect line capacitance. **07**
- (b) Describe one line diagrams of power systems. Explain how they are drawn and state its applications. **07**
- Q.2** (a) State and explain the advantages of pu system used for a power system. **07**
- (b) A three phase, 60 Hz, completely transposed 345 kV, 200 km line has $z = 0.032 + j0.35 \Omega/\text{km}$ and $y = j4.2 \times 10^{-6} \text{ S/km}$. Full load at the receiving end is 700 MW at 0.99 p.f leading and at 95% of rated voltage. Assuming a medium length line, determine the following: ABCD parameters of the nominal π circuit, sending end voltage and current and real power delivered by sending end. **07**
- OR**
- (b) Derive expressions of voltage phasor and current phasor at any point of a long transmission line as function of distance x from receiving end in terms of distributed parameters of the line, voltage phasor V_R (voltage at receiving end) and current phasor I_R (current at receiving end). **07**
- Q.3** (a) Explain how receiving end power circle diagram and sending end power circle diagram are drawn? State applications of them. **07**
- (b) Draw phasor diagrams of synchronous generator for under excited, normal excitation and over excitation conditions. Explain the operation of the machine for these three conditions. **07**
- OR**
- Q.3** (a) Write a short note on capacitance switching. **07**
- (b) Describe how zero sequence impedances of generator, transmission line and transformers are obtained. Draw zero sequence diagrams of transformer with different connections of primary and secondary. **07**
- Q.4** (a) Write a short note on the selection of circuit breaker **07**
- (b) Introduce symmetrical components and state their applications. Derive symmetrical components of a given set of three unbalanced current phasors. **07**
- OR**
- Q.4** (a) Describe analysis of single line to ground fault at a point of power system using symmetrical components and sequence networks. **07**
- (b) Derive A, B, C and D constants of a long transmission line from first principle. **07**
- Q.5** (a) Derive expressions of active power and reactive power at the receiving end of a lossless line. **07**
- (b) Discuss phase shifting in a single phase transformer and Y- Δ transformers. **07**
- OR**
- Q.5** (a) Write a short note on phenomena of corona. **07**
- (b) Explain the need of neutral grounding of system. Describe any one method of neutral grounding. **07**
