GUJARAT TECHNOLOGICAL UNIVERSITY PDDC - SEMESTER-IV EXAMINATION – SUMMER 2016

Subject Code:X40903Date:01/06/2016Subject Name:Power System Analysis and SimulationTime:10:30 AM TO 01:00 PMTotal Marks: 70Instructions:

- 1. Attempt all questions.
- 2. Make suitable assumptions wherever necessary.
- 3. Figures to the right indicate full marks.
- Q.1 (a) Briefly discuss the equivalent circuit of a synchronous machine. 07
 - (b) A single phase transformer of 11 kV/400 V, 50 Hz, 150 kVA has primary resistance and reactance as 2 Ω and 10 Ω respectively. The secondary resistance and reactance are 0.01 Ω and 0.05 Ω respectively. Determine the per unit value of impedance of transformer.
- Q.2 (a) Discuss the terms "Surge Impedance" and "Surge Impedance Loading" with 07 reference to long transmission line equations.
 - (b) A 3-phase, 50Hz, 150 km length overhead transmission line has the following 07 constants.

Resistance/phase/km = 0.15 Ω Inductance/phase/km = 1.2 mH Capacitance/phase/km = 0.0096 μ F

The line delivers a load of 30 MW at 0.9 p.f. lagging at a line voltage of 132 kV at the receiving end. Using nominal- π method, determine,

- (i) Sending end voltage
- (ii) Sending end current
- (iii)Sending end power factor

OR

- (b) State the physical significance of generalized ABCD constants of a 07 transmission line. State the units of these constants. Determine these constants for a medium transmission line with nominal-T configuration. Draw corresponding phasor diagram.
- Q.3 (a) Discuss the transients on a series R-L circuit when subjected to a sudden three 07 phase short circuit. Justify the assumptions made.
 - (b) Estimated short circuit MVA at the bus bars of a generating station is 1000 MVA and at other station is 666 MVA. The generated voltage of each station is 11 kV. Determine the possible short circuit MVA when the two stations are interconnected by a cable of reactance j0.5 Ω.

OR

- Q.3 (a) Discuss transients in case of a three phase short circuit on a synchronous 07 machine.
 - (b) An 11 kV, 100 MVA alternator having a subtransient reactance of 0.25 p.u.is supplying a 50 MVA motor having a subtransient reactance of 0.2 p.u. through a transmission line. The line has a reactance of 0.05 p.u. on a base of 100 MVA. The motor is drawing 40 MW at 0.8 p.f. leading with a terminal voltage of 10.95 kV when a three phase fault occurs at the generator terminals. Calculate the total current in generator and motor under fault condition.

- Q.4 (a) Explain: Symmetrical Component Transformation.
 - (b) A 30MVA, 11kV generator has $Z_1=Z_2=j0.2$ p.u. and $Z_0 = j0.05$ p.u. Determine 07 the fault current and line to line voltages when the generator terminals are subjected to
 - (i) A three phase fault
 - (ii) A single line to ground fault.

Assume generator neutral to be solidly grounded and fault impedance to be zero.

OR

Q.4	(a)	A balanced star connected load takes 90 A from a balanced 3-phase, 4-wire	07
		supply. If the fuses in two of the supply lines are removed, find the symmetrical	
		components of the line currents before and after the fuses are removed.	
	(b)	Discuss analysis of a double line to ground fault.	07
Q.5	(a)	Discuss analysis of a line to line fault.	07
	(b)	Compare Effectively Grounded System to Ungrounded System.	07
		OR	
Q.5	(a)	What is Arcing Ground? Also discuss :Resonant Grounding	07
	(b)	Write a short note on corona.	07

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