

National Institute of Technology, Hamirpur (HP)

Name of the Examination: M.Tech.

Branch : Power System Semester : 1st
 Course Name : Power Quality Assessment Course Code : EE-612

Time: 2 Hours

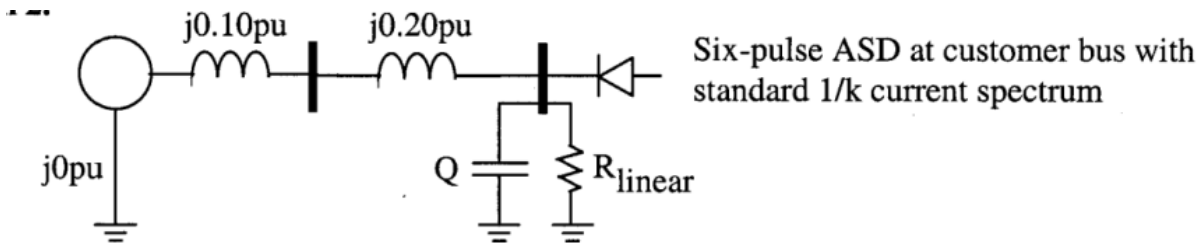
Maximum Marks: 50

Note : Attempt all questions. Assume any missing data.

Q1. Give the details of the different types of power quality variations and events. What different equipments are employed by the utilities for monitoring these PQ variations? (10)

Q2. Give the overview of level I and level II reliabilities studies of power system. What different data are required in both? Explain. (10)

Q3.



- Consider the above three-phase system. The impedances are for fundamental frequency. Assume that the system is balanced, that the base is 13.2kV, 10MVA, and that all fundamental voltages are 1.0pu. **Ignoring R_{linear}** , determine the value of Q (in three-phase kVAr) that will cause the system to resonate at the 5th harmonic.
- Using your Q from part a, now **include $R_{linear} = 5pu$** . Determine the six-pulse drive size (in kVA) that will yield $V_5 = 0.03pu$ at the customer bus.
- Using Q and $R_{linear} = 5 pu$ as above, what will be the six-pulse drive size (in kVA) that will yield $V_7 = 0.02 pu$ at the customer bus. (10)

Q4. Consider the following voltage and current in single phase system

$$v_s(t) = \sqrt{2} \times 230 \sin(\omega t) + \sqrt{2} \times 60 \sin(5\omega t - 45^\circ) + \sqrt{2} \times 30 \sin(7\omega t - 30^\circ)$$

$$i(t) = 2 + \sqrt{2} \times 10 \sin(\omega t - 30^\circ) + \sqrt{2} \times 5 \sin(5\omega t - 75^\circ) + \sqrt{2} \times 2 \sin(7\omega t - 60^\circ)$$

Determine the following: Active power, (P), Reactive power, (Q), Apparent power, (S), True, distortion and displacement power factors. (10)

Q5. What are the essentials of a grounded system? What different types of potentials arises with in the substation. Also with a diagram explain the effect of soil moisture and the content of salt on the soil resistivity. (10)