

2005 JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY

III B.TECH I SEMESTER REGULAR EXAMINATIONS

POWER SYSTEM -II

(ELECTRICAL ELECTRONICS ENGINEERING)

NOVEMBER 2005

TIME: 3 HOUR
MARK: 80

ANSWER ANY FIVE QUESTIONS ALL QUESTIONS CARRY EQUAL MARKS

1. (a) Derive the ABCD constants for long transmission lines.
- (b) Explain briefly classification of transmission lines based on line lengths with neat diagrams.
2. (a) Determine the critical disruptive voltage and corona loss for a 3-phase line space operating at 110kV which has conductors of 1.25cm diameter arranged in a 3.05m delta spacing. Assume air density factor of 1.07 and the dielectric strength of air to be 21kV/cm.
- (b) Explain in brief the disadvantages of corona and different methods of reducing corona loss.
3. (a) What is a sag template? Explain how this is useful for loading of towers and stringing of power conductors.
- (b) A transmission line has a span of 200m between level supports. The conductor has a cross-section area of 130mm², weights 1.2 kgf/m and has a breaking stress of 40kgf/mm². Calculate the sag for a factor of safety of 5, allowing for a maximum wind pressure of 125kgf/m² of projected surface.
4. (a) Derive the formula for dielectric stress in an UG cable.
- (b) Single-core, lead covered cable is to be designed for 66kV to earth. Its conductor radius is 10mm and its three insulating materials A,B and C have relative permittivities of 5,4 and 3 respectively and corresponding maximum permissible stresses of 3.8, 2.6 and 2.0 kV/mm (rms) respectively. Find the minimum diameter of the lead sheath.
5. (a) Why is there a phase difference between voltage and current in an ac circuit? Explain the concept of power factor?
- (b) Derive an expression for most economical power factor which may be attained by a consumer?
- (c) Explain, why a consumer having low power factor is charged at higher rates?
6. What are the various methods of voltage control in a power system, explain with neat sketches and vector diagrams.
7. (a) What are the advantages of expressing reactances in percentage values.?
- (b) Show that a generating plant having N section bus bars each rated at Q KVA with x% reactance, connected on the tie-bar system through bus-bar reactances of b% has a total short circuit KVA on one section of $[(Q/x)+Q(N-1)/(bN+x)]100$. If the section rating is 50000MVA; x=20% and b=10% find the short circuit KVA with
- three sections
 - five sections
 - Nine sections.
8. (a) Derive the expression for the fault current and the terminal voltages for a line to ground fault occurs at the terminals of an unloaded 3-- alternator. Assume that the alternator neutral is solidly grounded.
- (b) A 3-- , 10MVA , 11KV generator with a solidly earthed neutral point supplies a feeder . The positive, negative, and zero sequence impedances of generator and feeder are j1.2, j0.9, j0.4 and j1.0, j1.0, j3.0 respectively. If a fault from one phase to earth occurs on the far end of the feeder , calculate the fault current and line to neutral terminal voltage of the faulted phase.