

2006 JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY

III B.TECH I SEMESTER SUPPLEMENTARY EXAMINATIONS
POWER ELECTRONICS II
(ELECTRICAL & ELECTRONIC ENGINEERING)

NOVEMBER 2006

TIME - 3 HOUR
MARK - 80**Answer any FIVE Questions**
All Questions carry equal marks

1. (a) Write a short notes on 'overhead line conductors' bringing out the reasons for using ACSR conductors.
- (b) What is a bundled conductor? Why it is used? Give a few configurations of such conductors commonly employed.
- (c) Why Hollow conductors are required for EHV and UHV applications?
- (d) Find the loop inductance and reactance per km of a single phase overhead line consisting of two conductors, each 1.3 cm diameter. The spacing between conductors is 1.4 meters and frequency is 50 Hz. [4+4+4+4]
2. (a) Derive an expression for line to neutral capacitance for a 3-phase line when conductors are symmetrically placed.
- (b) What is transposition? Explain the method of transposition of 3-phase line over the lengths. [10+6]
3. (a) How a corona formation does affect the efficiency of the line? Give Peterson's formula to determine the power loss due to corona?
- (b) A 1 phase transmission line has a resistance of 0.2 ohm and an inductive reactance of 0.4 ohm. Find the voltage at the sending end to give 500 KVA at 2 KV at the receiving end at load power factors of
- i. unity
- ii. 0.707 lagging
- Illustrate with suitable phasor diagrams. [4+4+8]
4. A three-phase 66 KV transmission line is carried by strings of 5 suspension insulators. The capacitance of each unit insulator to the capacitance relative to earth is 4:1. Calculate the potential across each unit and the string efficiency. Assume that there is no leakage. [16]
5. An overhead line has a conductor of cross-section 2.5 cm² hard drawn copper and a span length of 150 metres. Determine the sag which must be allowed if the tension is not to exceed one-fifth of the ultimate strength of 4,175 Kg/Cm².
- (a) in still air and
- (b) with a wind pressure of 1.3 kg/metre and an ice coating of 1.25 cms. Determine also the vertical sag in the latter case.

6. (a) Describe the various types of insulating materials used in underground cables.

(b) A single core lead sheathed cable has three layers of different materials for insulation having relative permittivities 5,4,3 respectively and is to be designed for operating voltage of 66 kv to earth. The conductor diameter is 10 mm and the maximum safe working stresses of the three layers of insulation are 4, 3.2, 2 kv/mm respectively. Find the minimum overall diameter of the cable (inner diameter of the lead sheath)

[6+10]

7. Write short notes on the following

(a) p.f. improvement by synchronous condenser

(b) importance of p.f. improvement.

(c) Economics of p.f. improvement [4+6+6]

8. (a) A set of unbalanced vectors can be transformed into three sets of balanced components. Explain how this can be done using symmetrical components in detail.

(b) A system of unbalanced three phase voltages are given by 100V, +j200V and (-100-j160)V. Determine the three symmetrical components of the system.

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