CODE NO : RR 310203

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 series capacitor bank is to be installed at the mid point of the 300 Km line. The ABCD constants for 150 Km of the line areA = D = 0.95340.30 B = 90.33 |84.1 0 ohms, and C = 0.001014 |90.1 0 mhos. The ABCD constants of the series capacitor bank are A = D = 1 |0 ,B = 146.6 |-90 0ohms, C = 0. Determine the equivalent ABCD constants of the series combination of the line-capacitance-line.

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 transmission line has a span of 180m between level supports. The conductor has a cross-section area of 129mm2, weights 1.17 kgf/m and has a breaking stress of 42kgf/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) A single core cable has an inner diameter of 5cms and a core diameter of 1.5cm. Its paper dielectric has a working maximum dielectric stress of 60 kV/cm. Calculate the maximum permissible line voltage when such cables are used on a 3-phase power system.

(b) A 66kV concentric cable with two inter sheaths has a core diameter 1.8 cm. Dielectric material 3.5 mm thick constitutes the three zones of insulation. Determine the maximum stress in each of the three layers if 20kV is maintained across each of the inner two layers.

5. (a) Explain the causes for low power factor in a system?

(b) A 3--, 5KW induction motor has a power factor of 0.75 lagging. A bank of capacitors is connected in delta across the supply terminals and the p.f. is raised to 0.9 lagging. Determine the KVAR rating of the capacitors connected in each phase.

6. What are the various methods of voltage control in a power system, explain with neat sketches and vector diagrams.

7. (a) Explain the harmful effects of short circuit faults on the power system.

(b) Two generators are connected to a common bus bar, at which an out going feeder is connected. The generator ratings are 15MVA, 30% and 20MVA, 50% respectively. The percentage reactance of each alternator is based on its own capacity. The bus bar voltage is 12KV. Find the short circuit current that will flow into a complete 3-- short circuit at the beginning of the outgoing feeder.

8. (a) Derive the expression for the fault current and the terminal voltages for a line

to ground fault which occurs at the terminals of an unloaded 3-- alternator. Assume that the alternator neutral is grounded through reactance xn .

(b) A 20MVA, 11KV, 3-- 50HZ generator has its neutral earthed through a 5% re-actor .It is in parallel with another identical generator having isolated neutral. Each generator has a positive sequence reactance of 20%, Negative sequence reactance of 10% and zero sequence reactance of 15%. If a line to ground short circuit occurs in the common bus-bar ,determine the fault current .