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 3-phase,50Hz transmission line has resistance, inductance and capacitance per phase of 10ohms, 0.1H and 0.9μF respectively and delivers a load of 35 MW at 132 kV and 0.8 p.f laging. Determine the efficiency and regulation of the line using
(a) nominal T method
(b) nominal method.

2. (a) What do you mean by critical visual disruptive voltage?

(b) Find the critical disruptive voltage and the critical voltages for local and general corona on a 3-phase overhead transmission line, consisting of three stranded copper conductors spaced 2.5m apart at the corners of an equilateraltriangle. Air temperature and pressure are 210C and 73.6 cm Hg respectively. Take conductor dia 10.4mm, irregularity factor 0.85, local and general surface factors 0.7 and 0.8 respectively.

3. (a) What is a sag template? Explain how this is useful for loading of towers andstringing 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 fpr insulation resistance of aUG cable.

(b) In a coaxial cable the conductor diameter is 10 mm and the inner shath diameter is 50mm. There are two layers of insulation, the inner layer of dielectric constant 4 and a maximum working gradient of 6kV/mm has a radial thickness of 4.6 mm; the outer layer has dielectric constant 2.5 and maximum voltage gradient 5kV/mm. Calculate the maximum working voltage for the cable.

5. (a) Why is their 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. (a) Prove that the voltage angle changes appreciably at the load bus for change in active power of the load and no appreciable change in voltage for change in reactive power of the load .

(b) A load of 10000KWat a power factor of 0.8 lagging is supplied by a 3-phase line whose voltage has to be maintained at 33KV at each end. If the line resistance and reactance per phase are 5 ohms and 10 ohms respectively, calculate the capacity of the synchronous condenser to be installed for the purpose.

7. (a) What is the importance of base KVA in short circuit calculations?

(b) A generating station has four bus bar sections .Each section is connected to tie bar through 20% reactors rated at 200MVA.Generators of total capacity 100MVA and 20% reactance are connected to each bus bar section. Calculate the MVA fed to a fault under short circuit condition on two of the bus bars.

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.