Code No: OR320251 **OR**

III B.Tech II Semester Supplementary Examinations, April/May 2005
POWER SYSTEMS-II
(Electrical & Electronic Engineering)

Time: 3 hours **Max Marks: 70**

Answer any FIVE Questions
All Questions carry equal marks

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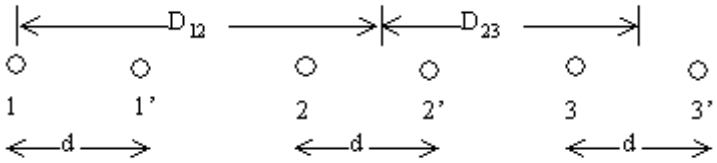
1. (a) Write a short notes on 'overhead line conductors' brining out the reasons for using ACSR conductors.
   (b) What is a bundled conductor? Why it is used? Give a few configurations of such conductors commonly employed.
   (c) Why Hollow conductors are required for EHV and UHV applications?
   (d) 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.

2. (a) Derive an expression for the capacitance between conductors of a single phase line. Deduce the expression for line to neutral capacitance. Discuss the approximation involved in deriving the above expressions.
   (b) A 400 KV, 3-phase single circuit bundled conductor line with two sub-conductors per phase has a flat configuration. The center to center distance between adjacent phases is 4m and distance between sub-conductors of phase is 45 cm. The radius of each sub-conductor is 1.6 cm . Find the capacitance per phase per km. (Given D_{12}=D_{23}=D_{31}=4m).



3. (a) Describe the phenomena of corona.
   (b) Find the disruptive critical voltage and visual corona voltage (local corona as well as general corona) for a 3 phase 220 KV line consisting of 22.26 mm diameter conductors spaced in a 6 m delta configuration. The following data can be assumed. Temperature 25^oC, pressure 76 cm of mercury, surface factor 0.84, irregularity factor for local corona 0.72, irregularity factor for general corona 0.82.

4. A three-phase 66 KV transmission line is carried by strings of 5 suspension insulators. The capacity of each unit insulator to the capacity relative to earth is 4:1. Calculate the potential across each unit and the string efficiency. Assume that there is no leakage.

5. An overhead line has a conductor of cross-section 2.5 cm^2 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/Cm^2.

   (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) Draw a neat sketch of the cross section of the following:

      i. 3-core belted cable

      ii. H-type cable

      iii. SL-type cable

   (b) A 1-core cable 1 km in length has a core diameter of 1.0 cm and a diameter under the sheath of 2.5 cm. The relative permittivity is 3.5. The power factor on open circuit is 0.03. Calculate

      i. the capacitance of the cable

      ii. its equivalent insulation resistance

      iii. the charging current

      iv. the dielectric losses, when the cable is connected to 6600 V, 50 Hz bus bars.

7. (a) What is a phase advancer? For which application this is used?

   (b) Explain in detail the operation of a phase advancer.

   (c) A factory load consists of the following

      i. an Induction Motor of 40 HP, with 0.8 p.f. and efficiency 0.85

      ii. a synchronous motor of 25 HP, with 0.9 p.f. leading and efficiency 0.9

      iii. Lighting load of 10 KW at 0 p.f.

      Find the annual electrical charges if the tariff is Rs. 100 per KVA of maximum demand per annum plus 150 paise per KWH, assuming the load to be steady for 2000 hours in a year

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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