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BIEE-003

01345

B.Tech. - IN - ELECTRICAL ENGINEERING (BTELVI)

Term-End Examination

June, 2012

BIEE-003 : POWER SYSTEM - I

Time : 3 hours *Maximum Marks : 70*

Note : *Attempt **any seven** questions of the following and each question carry **equal** marks. Use of scientific calculor is **allowed**.*

1. Explain the factors which determine the formation of corona on overhead lines. What are the advantages and limitations of corona and how it can be minimised ? **10**

2. Write a short note on different type of insulatores used for overhead lines and their applications. Show with the help of a neat sktch, the electrostatic field of a pin insulator. **10**

3. A transmission line has a span of 275 metres between level supports. The conductor has a diameter of 19.53 mm, weigh 0.844 kgf/m and **10**

has an ultimate breaking strength of 7950 kgf. Each conductor has a radial covering of ice 9.53 mm thick and is subjected to a horizontal wind pressure of 40 kgf / m^2 of the ice covered projected area. If the factor of safety is 2, calculate the deflected sag and the vertical component of the sag. One cubic metre of ice weighs 913.5 kgf.

4. Find an expression for the flux linkages : **2x5=10**

   (a) due to a single current carrying conductor.

   (b) in parallel current carrying conductors.

5. Show that maximum stress in a single - core cable is : **10**

$$\frac{2V}{d \log_e D/d}$$

Where V is the operating voltage and d and D are the conductor and sheath diameter.

6. Calculate the capacitance and charging current of a single core cable used on a 3-phase, 66 kV system. The cable is 1 km long having a core diameter of 10 cm and an impregnated paper insulation of thickness 7cm. The relative permittivity of the insulation may be taken as 4 and the supply at 50 HZ. **10**

7. Each conductor of a $3-\phi$ overhead line is suspended from a cross arm of a steel tower by a string of 4 suspension insulators. The voltage across the second unit is 14.2 kV and across the third 20 kV. Find the voltage between the conductors and the string efficiency. **10**

8. Derive an expression for the capacitance of a $1-\phi$ overhead transmission line. **10**

9. Draw the phasor diagram of a short transmission line and derive an expression for voltage regulation. **10**

10. Write short notes on ***any two*** of the following : **2x5=10**

    (a) Proximity effect and skin effect

    (b) Shielding and grading

    (c) Transmission of power by different systems

    (d) Vibration dampers