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

Term-End Examination

June, 2011

BIEE-003 : POWER SYSTEM - I

Time : 3 hours   *Maximum Marks : 70*

*Note :   Attempt any **seven** (7) questions of the following and each question carry **equal** marks.*

1. Derive the expression for Inductance of 3- phase   **10**
    unsymmetrically spaced transmission line for
    single conductor.

2. Explain transmission of power by different   **10**
    systems and also discuss comparison of different
    system of transmission.

3. Find the critical disruptive voltage and the critical   **10**
    voltage for local and general corona on a three
    phase overhead transmission line, commiting of
    three standard copper conductors spaced 2.5 m
    apart at the corner of an equilateral triangle. Air
    temperature and pressure are 21°C and 73.6 cm ng
    respectively. The conductor dia, irregularity factor
    and surface factors are 10.4 mm, 0.85, 0.7 and
    0.8 respectively.

4. Show that a three phase system, having a line voltage V, total power P and Impedance per line Z has the same regulation and efficiency as a single phase system with a voltage V, power P and loop impedance Z ? **1**

5. The transmission line has a span of 275 meters between level supports. The conductor has a diameter of 19.53 mm, weight 0.844 kgf/m and 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/m² of the ice covered projected area. If the factor of safely is 2. Calculate the deflected sag and the vertical component of the sag. One cubic meter of ice weight 913.5 kgf ? **1**

6. The conductor of 1 cm dia. passes centrally through a porcelain cylinder of internal dia. 2 cms and external dia 7 cms. The cylinder is surrounded by a tightly fitting metal sheath. The permittivity of porcelain is 5 and the peak voltage gradient in air must not exceed 34 kV/cm. Determine the maximum safe working voltage. **1**

7. The conductor consist of seven identical strands each having a radius of r. Determine the factor by which r should be multiplied to find the self GMD of the conductor ? **1**

8. What is cable capacitance ? Derive the expression 10
   for capacitance in a three core belted cable.

9. Name the different type of insulator used for 10
   overhead lines and explain suspension type
   insulator in detail.

10. Write short notes on *any two* of the following. 10
    (a) Proximity effect and skin effect
    (b) Methods of improving corona.
    (c) Kelvin's law and modified Kelvin law.