C 58331 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION JUNE 2009

EE 2K 604—POWER SYSTEMS—I

Time : Three Hours Maximum : 100 Marks

Part A

1. (a) Draw the schematic diagram of hydro power plant and explain the stages.

(b) Describe the terms "Diversity factor" and "plant factor".

(c) What are the chief requirements of line insulator ? Mention different types of line insulators.

(d) Describe the construction of cable with neat sketch.

(e) Mention the limitations of Kelvin's law.

(f) Describe the ring main distribution system.

(g) Explain the terms "efficiency of line" and "regulation of line".

(h) Explain with neat sketch the nominal π representation of transmission line.

(8 × 5 = 40 marks)

Part B

UNIT I

2. (a) Give the comparison between the power generations from solar, wind, geothermal in terms of merits, demerits, efficiency and generation cost.

Or

(b) Give the comparison between the power generations from tidal, magneto hydro dynamic and fuel cell in terms of merits, demerits, efficiency and generation cost.

UNIT II

3. (a) An overhead line with standard copper conductors is supported on two poles 200 mm apart having a difference in level of 10 metres. The conductor diameer is 2.0 cm and weighs 2.30 kg per metre length. Calculate the sag at the lower support under the conditions if wind provides a pressure of 57.5 per square metre of the projected area and a factor of safety is 4. The maximum tensile strength off copper is 4220 kg per square cm.

Or

(b) The potential across the 6 units of the string is equalised by using graded insulator. If the capacitance of the top insulator is 8C and that of pin to earth is C, calculate the capacitance of the other units. If instead of graded insulators, a guard ring is used to equalize the potential, calculate the capacitance of each link to conductor. Assume that the insulators used in the string are similar to that of the top.

Turn over

UNIT III

4. (a) A distributor is fed at both ends at same voltage 250 V. The total length of the feeder 200 m. and the loads are tapped off as follows :

50 A at 50 m fromA, 40A at 75 m from A, 30 A at 100 m from A, and 25A at 150 m from A. Calculate

(i) the point of minimum potential ;

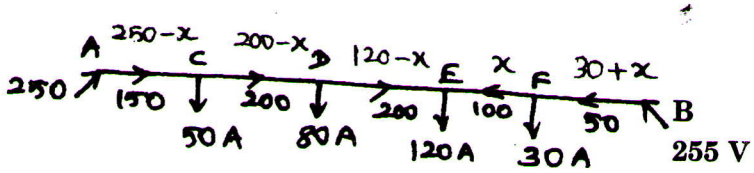
(ii) the current in each section ;

(iii) the voltage at each load point.

The resistance per 1000 metres of the conductor for go and return is $0.8\,\Omega$.

Or

(b) A two conductor distributor has a length of 700 m. and is loaded as shown, the distance being represented in meters. The ends A and B are maintained at 250 and 255 volts respectively. If the minimum potential allowable at consumer's terminal is 245 V, calculate the diameter of the conductor used. Resistivity is $1.7\ \mu\Omega - \text{cm}$.



UNIT IV

5. (a) A 3-phase 50 Hz transmission line hasd conductors of section 90 mm^2 and effective diameter of 1 cm and are placed at the veretices of an equilateral triangle of side 1 metre. The line is 20 km long and delivers a load of 10 MW at 33 kV and p.f. 0.8. Neglect capacitance and assume temperature of 20° C. Determine the efficiency and regulation of the line.

Or

(b) Derive the expression for the efficiency of transmission line when it is modelled as (i) nominal π ; and (ii) nominal T.

(4 × 15 = 60 marks)