Reg. No. : ....

Name : ....

Fourth Semester B.Tech. Degree Examination, February 2016
(2013 Scheme)
Branch : Electrical and Electronics Engineering
13.406 : POWER GENERATION, TRANSMISSION AND DISTRIBUTION (E)

Time : 3 Hours   Max. Marks : 100

PART – A

Answer **all** questions :

1. Which are the nuclear power stations in India ? What are the merits and demerits of nuclear power generation ?

2. What is distributed generation and what is their role in the present worldwide energy scenario ?

3. What is meant by skin effect in AC transmission system ?

4. What is diversity factor ? What is its significance ?

5. What are the advantages and disadvantages of bundled conductor line in a transmission system ?

6. What is Ferranti effect ? Draw the phasor diagram under this condition.

7. What is sag template ? What is its use in transmission line design of power system ?

8. Explain the significance of r/R ratio in the design of cables.

9. Compare the volume of conductor material required for a single phase AC system with a 2-wire DC system (one conductor earthed) for the transmission of a given power P.

10. What are the different causes of low power factor in a supply system ?   **(10×2=20 Marks)**

PART – B

Answer **any one full** question from **each** Module :

Module – I

11. a) Explain any four types of renewable and non-conventional sources of electrical energy.   **10**

    b) A generating station has a maximum demand of 25 MW, a load factor of 60%, a plant capacity factor of 50% and a plant use factor 72%. Find i) the daily energy produced ii) the reserve capacity of the plant iii) the maximum energy that could be produced daily if the plant while running as per schedule were fully loaded.   **10**

12. a) Explain the significance of load curves in the design of a power system.   **8**

    b) Estimate the generating cost per kWh delivered by a generating station from the following data. Plant capacity = 50 MW ; Annual load factor = 40% ; Capital cost = Rs. 1.2 crores ; Annual cost of wages, taxation etc. = 1.0 paise/kWh generated, interest 5% per annum, depreciation 6% per annum of initial value.   **12**

Module – II

13. a) Explain the necessity of transposing of conductors in a 3 phase transmission system and derive the expression for the inductance of a 3 phase transposed line.   **10**

    b) A double circuit 3 phase line has its conductors at the vertices of a regular hexagon of side 2 m. The diameter of each conductor is 1.25 cm. Find i) The capacitance per phase per kilometer ii) If the line voltage is 13.2 kV and line length is 100 km find the charging current and charging mega volt amperes.   **10**

14. a) Draw the phasor diagram for nominal-π model of a transmission line and derive the expression for sending end voltage and current.   **10**

    b) A three phase long line has constants A = 0.8698 $\angle$ 2.36° and B = 186.9 $\angle$ 75.15° ohms. Both the sending and receiving end voltages are to be maintained at 154 kV. Find the reactive VARS which the compensation equipment must supply to maintain the voltage profile i) When the line supplies a load of 50 MVA at 0.85 lagging power factor ii) When the line open circuited at the receiving end.   **10**

Module – III

15. a) Explain the necessity of grading of cables. What are the different types of grading ? Describe with neat diagram any one type of grading of cables for the same maximum and minimum stresses at different layers. **10**

    b) The towers of height 40 m and 30 m respectively support a transmission line conductor at a water crossing. The horizontal distance between the towers is 300 m. If the tension in the conductor is 1590 kg, find the clearance of the conductor at a point midway between the supports. Weight of the conductor is 0.8 kg/m. Bases of the towers can be considered to be at the water level. **10**

16. a) What are the factors affecting Corona and differentiate between disruptive critical voltage and visual critical voltage. **10**

    b) A suspension string insulator has 3 units ; each unit can withstand a maximum voltage of 11 kV. The capacitance of each point and metal work is 15% of the capacitance of each disc. Find (i) The maximum line voltage for which the string can be used. (ii) String efficiency. **10**

Module – IV

17. a) Explain different type of Power Tariff schemes. **10**

    b) A single phase distributor PQ has a resistance of 0.2 ohm and reactance of 0.3 ohm. At far end Q the voltage is 240 V and the current is 100 A at pf 0.8 lagging. At midpoint the current is 100 A at 0.6 lagging pf with respect to voltage at P. Find the supply voltage and phase angle between voltages at P and Q. **10**

18. a) Explain the different methods of improving power factor in a power system. **10**

    b) A 2-wire DC distributor AB 500 m long is fed from both ends and is loaded uniformly at the rate of 1.0 A/m. At feeding point A, the voltage is maintained at 255 V and at B at 250 V. If the resistance of each conductor is 0.1 ohm/km, determine (i) The minimum voltage and the point where it occurs. (ii) The currents supplied from feeding points A and B. **10**

———————