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Reg. No. : .....

Name : .....

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

Time : 3 Hours Max. Marks : 100

Instruction *: Graph Sheet should be provided*

PART – A

Answer **all** questions :

1. What are the advantages of interconnected grid ?
2. Explain the significance of load curve.
3. What is Surge Impedance of a transmission line ?
4. What is skin effect ? Why it is absent in the d.c. system ?
5. What are power circle diagrams ? Explain the significance.
6. State and explain Kelvin's law for obtaining economic size of conductor for transmission.
7. What is a stringing chart ? What is its utility ?
8. Write short note on 'Gas Pressure cables'.
9. Explain the causes of low power factor of the supply system.
10. Write short note on Ring Main Distributor. **(10×2=20 Marks)**

P.T.O.

PART – B

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

Module – I

11. a) Explain the terms load factor and diversity factor. How do these factors influence the cost of generation ? 10

b) A hydro electric power plant costs Rs. 3,000 per kW of installed capacity. The total annual charges consist of 5% as interest, depreciation at 2%, operation and maintenance at 2% and insurance, rent etc. at 1.5%. Determine a suitable two-part tariff if the losses in transmission and distribution are 12.5% and diversity of load is 1.25. Assume that maximum demand on the station is 80% of the capacity and annual load factor is 40%. What is the overall cost of generation per kWh ? Take installed capacity of the station as 100 kW. 10

OR

12. a) Explain with a neat diagram a wind electric generating power plant. 10

b) A generating station has a maximum demand of 100 kW and costs Rs. 1.6 lakhs. The annual fixed charges are 12% consisting of 5% interest, 5% depreciation and 2% taxes. Find the fixed charges per kWh if the load factor is :

i) 100% and

ii) 50%. 10

Module – II

13. a) Derive an expression for the Capacitance per phase of a 3 phase double circuit overhead transmission line with unsymmertrical spacing (Transposed line). 10

b) A 3Φ, 50 Hz, 150 km overhead transmission line has the following distributed constants per phase : Resistance/km = 0.1Ω, Reactance/km'= 0.5Ω, Susceptance/km = 3×10^{-6} S. If the line delivers 50 MW at 110 kV and 0.8 p.f. lagging. Determine :

i) Sending end current

ii) Sending end voltage for this load.

Use Nominal π method. 10

OR

14. a) Evaluate the generalized circuit constants for medium transmission line using Nominal T method. Draw the phasor diagram also. 10

b) The sending end voltage and receiving end voltage of a 3 phase line are 240 kV and 220kV line to line respectively. Its generalized constants of one phase are : $A = D = 0.99 + j0.0132\,\Omega$, $B = 24.75 + j165\,\Omega$ and $C = -0.000044 + j0.0011\,\mho$. Draw the Receiving end power circle diagram and determine active and reactive power received when the angle between sending end and receiving end voltage phasors is 30°. 10

Module – III

15. a) What is meant by disruptive critical voltage and visual critical voltage ? State the effects of conductor size, spacing and condition of the surface of the conductors on these voltages. 10

b) A 3 phase, 220 kV, 50 Hz transmission line consists of 30 mm diameter conductor spaced 2.1 metres apart in the form of an equilateral triangle. If the temperature is 38°C and atmospheric pressure is 76 cm, calculate the corona loss per km of the line. Assume the irregularity factor as 0.83. 10

OR

16. a) Discuss various methods by which the voltage across the units of a string of insulator can be equalized. Illustrate your answer by a string of 3 insulator units. 10

b) The capacitance of a 3 phase belted cable are 11.34 μF between the three cores bunched together and the lead sheath and 6.66 μF between one core and other two connected to sheath. Find the charging current drawn by the cable when connected to 66 kV, 50 Hz supply. 10

Module – IV

17. a) How does A.C. distribution differ from D.C. distribution ? What is the importance of load power factors in A.C. distribution ? 10

b) Two tram cars (A and B) 2 km and 6 km away from a sub-station return 40 A and 20 A respectively to the rails. The sub-station voltage is 600 V d.c. the resistance of trolley wire is 0.25 Ω/km and that of track is 0.03 Ω/km. Calculate the voltage across each tram car. 10

OR

18. a) Explain different types of Tariff schemes. 10

b) A single phase motor connected to 400 V, 50 Hz supply takes 31.7 A at a power factor of 0.7 lagging. Calculate the capacitance required in parallel with the motor to raise the power factor to 0.9 lagging. 10
