D 70292 (Pages : 3) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) [09 SCHEME] DEGREE EXAMINATION, NOVEMBER 2014

EE/PTEE 09 502—ELECTRICAL POWER GENERATION, TRANSMISSION AND DISTRIBUTION

Time : Three Hours Maximum : 70 Marks

Part A

All questions **compulsory.**

1. A diesel station supplies the following loads to various consumers :

   Industrial consumer = 1500 kW ; Commercial establishment = 750 kW ; Domestic power = 100 kW ; Domestic light = 450 kW.

   If the maximum demand on the station is 2500 kW and the number of kWh generated per year is 45×10^5, determine diversity factor and load factor.

2. What is meant by string efficiency as applied to suspension insulators ?

3. Define disruptive critical voltage.

4. State the characteristics which the line supports should possess.

5. Find the capacitance of a 80 km. long 3 phase, 50 Hz overhead transmission line consisting of 3 conductors, each of 1.8 cm. diameter and spaced 2.4 m. at the corners of an equilateral triangle.

($5 \times 2 = 10$ marks)

Part B

Answer any **four** *questions.*

6. Compare hydro electric and thermal power plants.

7. Explain briefly the factors which affect the sag.

8. Write a brief note on shackle insulator and stray insulator.

9. Explain the properties which the insulating materials for cables should possess.

10. Give a comparison between overhead system and under ground system.

Turn over

11. Derive from fundamentals, the following relationship between sending and receiving end voltages and currents:

$$\bar{V}s = A\bar{V}_R + B\bar{I}_R$$
$$\bar{I}s = C\bar{V}_R + D\bar{I}_R$$

(4 × 5 = 20 marks)

Part C

12. Describe with the help of neat diagram, the working of a solar power plant. Bring out its salient features.

Or

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

(b) Describe the desirable characteristics of a tariff.

14. (a) Write a short note on sag and tension at erection.

(b) A string of six insulators (suspension type) is to be graded to obtain uniform distribution of voltage across the string. If the capacitance of the top unit is 10 times the capacitance to ground of each unit, determine the capacitance of the remaining unit.

Or

15. (a) Explain the phenomenon of corona.

(b) A certain three phase equilateral transmission line has a total corona loss of 53 kW at 106 kV and a loss of 98 kW at 110.9 kV. Calculate disruptive critical voltage, and corona loss at 113 kV.

16. An electric train taking a constant current of 500 A moves on a section of line between two sub-stations 6 kW apart and maintained at 585 V and 600 V respectively. The track resistance is 0.04 Ω/km both go and return. Find the point of minimum potential along the track and currents supplied by two substations at that instant.

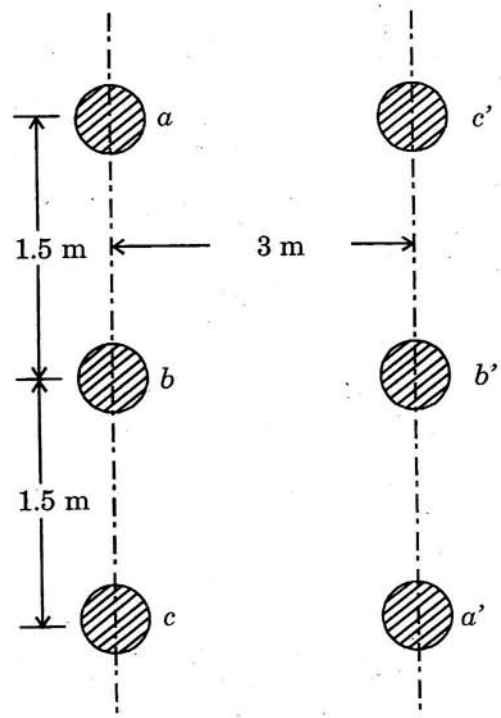
Or

17. Explain briefly the following :—

(a) Murray loop test.

(b) Varley loop test.

18. Calculate the inductance per phase per km length of the system of conductors shown in Figure. 1 Self GMD of one conductor is 0.8 cm. Assume line regularly transposed.



Or

19. A balanced 3-phase load of 30 MW is supplied at 132 kV, 50 Hz and 0.85 pf lagging by means of a transmission line. The series impedance of the line is $(20 + j\,52)\ \Omega$ and the total phase neutral admittance is 315×10^{-6} S. Use nominal T method to determine the ABCD constants and sending end line voltages.

(4 × 10 = 40 marks)