Student Exam No._____

GANPAT UNIVERSITY

B. TECH. SEMESTER: VIII (ELECTRICAL ENGINEERING)

REGULAR EXAMINATION APRIL - JUNE 2015

2EE802: POWER SYSTEM PRACTICE & DESIGN

Time: 3 Hours **Total Marks: 70**

Instruction:
1. All questions are compulsory.
2. Answers of each section must be written in separate answer book.
3. Figures to the right indicate full marks.
4. Assume suitable data wherever necessary.

Section – I

Que. – 1 **(A)** How does the size of the conductor and the spacing between conductors affect the transmission line performance? **[06]**

(B) Discuss the effect of conductor area and phase separation on bundled conductor line capability in EHV transmission line design. **[06]**

OR

Que. – 1 **(A)** Find the most economical current density of a 3 core 300 m long distribution cable supplying a three phase load of 100 kW at 400 V and 0.8 power factor lagging for 4000 hours per annum. The cost of the cable including installation is Rs. (30 a + 50) per meter, where 'a' is the area of each conductor in sq.cm. Interest and depreciation rate is 10% per annum and the energy cost is 20 paise per unit. The resistivity of conductor is 1.84 μΩcm. **[06]**

(B) What are the design considerations for EHV transmission line? **[06]**

Que. – 2 A three phase, 230 kV transmission line designed to transmit 85000kW at 0.9 power factor has constant A=D=0.9855∟0.34, B=78.5∟68.22, C=0.000396∟90.12 (i) Decide no. of insulators and calculate string efficiency. (ii) Draw receiving end power circle diagram and show the load point on it. **[11]**

OR

Que. – 2 **(A)** What is lamp flicker? What are its types and causes? What types of loads are responsible for it? How can it be reduced? **[06]**

(B) What are corona losses? Explain Peek's and Peterson's formula for calculating the corona loss with their application and limitations. **[05]**

Que.– 3 **Attempt any two.** **[12]**

(A) How is the selection of arrester voltage rating, discharge current and discharge voltage done?

(B) Explain the design of earthing grid of substation.

(C) How does corona depends on the diameter of the conductor, the number of insulators and spacing of conductors of EHV transmission line?

Section – II

Que. – 4 **(A)** Explain the methods of power system improvement. **[06]**

(B) The following loads are connected to a three phase four wire 415/230 V distribution system. **[06]**

(i) A three phase 12 kW load at 0.85 power factor lagging. (ii) A single phase 2 kW load at 0.9 power factor lagging between the phase R and neutral. (iii) 4.1 – j 2.56 A load current in Y phase. (iv) A single phase 2.5 kW load at unity power factor between the phase B and neutral. The phase sequence is RYB. Calculate the currents in each line and current in Neutral.

OR

Que. – 4 **(A)** How are the losses in the system determined before system improvement measures and after system improvement measures? Explain the effect of utilization factor and loss load factor. **[06]**

(B) Discuss the considerations in the location of substations. **[06]**

Que. – 5 A 230 kV transmission line with typical span of 220 m and maximum permissible sag is 3.6 m. (a) Design basic mechanical structure of transmission tower with appropriate dimensions. (b) Design earth wire and suggest its location on tower under heavy loading condition with earth wire of 1 cm diameter and weight of 0.607 kg/m and ice covering of 1 cm thick and wind loading of 39 kg/m2 .Calculate tension in earth wire and factor of safety. **[11]**

OR

Que. – 5 **(A)** Derive sag-tension relation for a given span with the towers at the ends located at unequal levels. **[06]**

(B) Discuss tolerable step voltage, touch voltage and transferred potential. **[05]**

Que. – 6 **Attempt any two.** **[12]**

(A) Define insulation co-ordination. Explain insulation co-ordination curves.

(B) Explain the main considerations in planning and designing generating stations in power systems with reference to (i) size of units (ii) Role of different types of power plants.

(C) Draw a single line diagram of a typical 220 kV/33 kV transmission substation and discuss the factors affecting the layout of substation.

END OF PAPER