Student Exam No._____

GANPAT UNIVERSITY

B. TECH. SEMESTER. VIII (ELECTRICAL ENGINEERING)

REGULAR EXAMINATION APRIL – JUNE 2016

2EE 802: 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)** Derive sag-tension relation for a given span with the towers at the ends located at unequal levels. How is the expression simplified for conductors supported at equal levels? **06**

(B) Explain the use of bundled conductors in EHV transmission lines. Discuss the spacing, selection of size and number of conductors for EHV lines. **06**

OR

Que. – 1 **(A)** Discuss the points taken into considerations while choosing the location of substations. **06**

(B) What is tuned lines? What are its features? Discuss the possibility of using tuned lines in power system. **04**

(C) Define the following terms: (a) Dry Flashover voltage and (b) Protective margin. **02**

Que. – 2 **(A)** A three phase, 220 kV transmission line designed to transmit 75000 kW at 0.8 power factor has constant $A = D = 0.9055 \angle 0.6^0$, $B = 156 \angle 84.5^0$, $C = 0.00116 \angle 90.2^0$. (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)** 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) What are the financial considerations to make the system improvement scheme viable? Explain with an illustration. **05**

Que. – 3 **Attempt any two:** **12**

(A) Explain corona on EHV lines. How does it depend on the diameter of the conductor, the number of insulators and spacing of conductors?

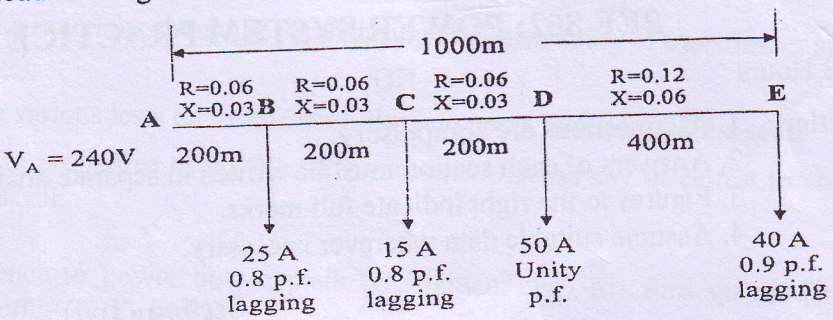
(B) What do you mean by insulation co-ordination? Discuss in detail about the impulse volt-time sparkover characteristics and insulation co-ordination curve.

(C) Explain the main considerations in planning and designing generating stations in power system with reference to the (a) size of units and (b) role of different types of power plants.

Section – II

Que. – 4 **(A)** What is lamp flicker? Classify them and discuss the causes for it. Which types of loads are responsible for it? How it can be minimized? **06**

(B) A two core cable having resistance of 0.3Ω and reactance of 0.15 Ω/km is loaded in figure. Find the voltage at the loading points. **06**



OR

Que. – 4 **(A)** Discuss the design of an earthing grid for a substation. **06**

(B) Define substation. Classify the substations according to the construction and service requirements. List out the equipment used in the substation and explain the functions of any three equipment in detail. **06**

Que. – 5 **(A)** Design the main mechanical features for 230kv transmission line. Detail of the lines are as follows. **11**

Current = 237A, Current carrying capacity = 350 A, Equivalent copper section = 0.968cm^2, Equivalent spacing = 10.2m,

Conductor used is ACSR 30/0.259 AI strands, 7/0.259 steel strands, overall diameter 1.814cm, weight per kilometre 728kg, breaking strength of conductor is 6883 kg. The modulus of elasticity E for ACSR conductor may be taken as 0.85 × 106 kg/cm^2. If a typical span is chosen as 215m long, find the sag and length of the conductor in this span. (a) Under maximum loading with ice covering of 1cm thick and wind loading of 39 kg/m^2. Assume that wind load act on the projected area of the conductor (b) Find vertical sag (c) If the maximum permissible sag is 3.5m, and it occurs at 0° C with 1cm thick ice and no wind or at maximum temperature of 60° C and no wind, find length of the conductor at the time of maximum sag.

OR

Que. – 5 **(A)** State the expressions for corona loss in kW per km of transmission line. What are the limitations of Peek's formula and Peterson's formula? Explain the various factors affecting the corona. **06**

(B) Discuss secondary distribution design in detail. **05**

12

Que. – 6 **Attempt any two:**

(A) Define touch voltage and step voltage and also derive the equations for tolerable touch and step voltages.

(B) How do you determine the voltage regulation of a loaded feeder with concentrated load at given distances? Explain with illustration of a case on 11 kV feeder.

(C) Suggest a suitable insulation co-ordination scheme for a 220 kV substation. Take residual voltage= 649 kV (Peak).

END OF PAPER