

GANPAT UNIVERSITY
B. TECH. SEMESTER. VIII (ELECTRICAL ENGINEERING)
CBCS REGULAR EXAMINATION APRIL – JUNE 2017
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) Explain the factors to be considered in the selection of a voltage suitable for transmitting a certain amount of power over a given distance. (06)
- (B) Discuss corona on EHV lines. How does it depend on the diameter of the conductor, the number of insulators and spacing of conductors? (06)

OR

- Que. – 1** (A) State the advantages of interconnecting large power systems and explain the development and use of interconnections in the systems. (06)
- (B) What do you mean by string efficiency? Discuss the main steps of electrical design to decide the numbers of insulators for high voltage transmission line. (06)
- Que. – 2** (A) Enlist main considerations in planning and designing of generating stations and explain main point in deciding size of units and role of different types of power plants. (06)
- (B) What are the design considerations for EHV transmission lines? (05)

OR

- Que. – 2** (A) Explain the methods of system improvements with reference to improvement on L.T. system, 11 kV feeders, shunt compensation, transformer capacities, sub transmission lines and new substations. (06)
- (B) A three phase, 220 kV transmission line designed to transmit 75000 kW at 0.8 power factor has constant $A = D = 0.9055 \angle 0.6^\circ$, $B = 156 \angle 84.5^\circ$, $C = 0.00116 \angle 90.2^\circ$. (i) Decide no. of insulators and calculate string efficiency. (ii) Draw receiving end power circle diagram and show the load point on it. (05)
- Que. – 3** Attempt any two: (12)
- (A) What do you mean by insulation co-ordination? Discuss in detail about the impulse volt-time spark over characteristics and insulation co-ordination curve.
- (B) What do you mean by RI? Discuss RI as important point of consideration for EHV transmission lines design?
- (C) Discuss the design of earth wire for transmission line.

Section – II

Que. – 4 (A) A 3810/6600 V wye connected feeder distributor has peak load of 130 A (06)
at 0.7 power factor lagging. The circuit has a resistance of 0.65Ω and
reactance of $1.5 \Omega/\text{phase}$. Shunt capacitors are to be used for
improvement of power factor.

i) Find kVAR capacity of shunt capacitors to be connected in wye to
raise the power factor of distribution system at peak load from 0.7 to
0.85 lagging.

ii) Find the kVA capacity of line and the current in line.

iii) What is the voltage drop before and after the installation of shunt
capacitors and the regulation of line?

(B) Explain the methods of designing primary distribution system with (06)
reference to (i) choice of voltage, (ii) conductor size, (iii) type of
distribution system, and (iv) voltage drop.

OR

Que. – 4 (A) Deduce an equation showing the relationship between sag & tension for (06)
a given span with the towers of equal heights at the ends.

(B) Discuss the design of an earthing grid for a substation. (06)

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

Conductor used is ACSR 30/0.259 AI strands, 7/0.259 steel strands,
overall diameter 1.814cm, weight per kilometer 728kg, breaking
strength of conductor is 6883 kg. The modulus of elasticity E for ACSR
conductor may be taken as $0.85 \times 10^6 \text{ kg/cm}^2$. 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 40 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 4 m, and it occurs at 0°C with 1.1cm thick ice and no
wind or at maximum temperature of 50°C and no wind, find length of
the conductor at the time of maximum sag.

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

OR

Que. – 5 (A) What is meant by the disruptive critical voltage and visual critical (06)
voltage? State the effect of conductor size, spacing and condition of the
surface of conductors on these voltages.

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

Que. – 6 Attempt any two: (12)

(A) Write a short note on lamp flicker.

(B) What are the financial considerations to make the system improvement
scheme viable? Explain with an illustration.

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

END OF PAPER