Student Exam No._____

# GANPAT UNIVERSITY

## B. TECH. SEMESTER: V (ELECTRICAL)

## REGULAR EXAMINATION NOV – DEC 2015

## 2EE 504: ELECTRICAL POWER SYSTEM- II

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

**Instruction:** 1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicates full marks.

### Section - I

**Que. – 1** **(A)** With necessary diagrams and equations, explain the distributor fed at both ends with concentrated loading. **06**

**(B)** A 2-wire d.c. distributor cable AB is 2 km long and supplies load of 100 A, 150 A, 200 A and 50 A situated 500 m, 1600 m and 200 m from the feeding point A. Each conductor has a resistance of 0.01 Ω per 1000 m. Calculate the p.d. at each load point if a p.d. of 300 V is maintained at point A. **06**

**OR**

**Que. – 1** **(A)** With a neat diagram, discuss radial and interconnecting distribution systems. **06**

**(B)** A 2-wire d.c. distributor AB is fed from both ends. At feeding point A, the voltage is maintained as at A 230 V and at B 235 V. The total length of the distributor is 200 meters and loads are tapped of as under: **06**
25 A at 50 metres from A; 50 A at 75 metres from A; 30 A at 100 metres from A; 40 A at 150 metres from A. The resistance per km of one conductor is 0.3 Ω. Calculate: (i) currents in various sections of the distributor (ii) minimum voltage and the point at which it occurs.

**Que. – 2** **(A)** How does A.C. distribution differ from D.C. distribution? Also discuss the importance of load power factors in A.C. distribution. **05**

**(B)** A single phase a.c. distributor AB 300 m long is fed from A and is loaded as under: **06**
(i) 100 A at 0.707 p.f. lagging 200 m from point A
(ii) 200 A at 0.8 p.f. lagging 300 m from point A
The load resistance and reactance of the distributor is 0.2 Ω and 0.1 Ω per km. Calculate the total voltage drop in the distributor. The load p.f refers to the voltage at the far end.

**OR**

**Que. – 2** **(A)** A single phase ring distributor ABC is fed at A. The loads at B and C are 20 A at 0.8 p.f. lagging and 15 A at 0.6 p.f. lagging respectively; both expressed with reference to the voltage at A. The total impedance of the three sections AB, BC and CA are (1+j1), (1+j2) and (1+j3) ohms respectively. Find the total current fed at A and the current in each section. Use Thevenin's theorem to obtain the results. **05**

(B) A 3-phase, 4-wire distributor supplies a balanced voltage of 400/230 V to a load consisting of 30 A at p.f. 0·866 lagging for R-phase, 30 A at p.f. 0·866 leading for Y phase and 30 A at unity p.f. for B phase. The resistance of each line conductor is 0·2 Ω. The area of X-section of neutral is half of any line conductor. Calculate the supply end voltage for R phase. The phase sequence is RYB. 06

**Que. – 3 Attempt any three:** 12

(A) Discuss the different methods of laying underground cables.

(B) Derive the equation for capacitance of a single core cable.

(C) Explain the Murray loop test to locate the earth fault.

(D) A 33 kV single core cable has a conductor diameter of 1 cm and a sheath of inside diameter 4 cm. Find the maximum and minimum stress in the insulation.

**Section – II**

**Que. – 4** (A) Explain the different types of bus bar arrangements used in substations with necessary diagrams. 06

(B) Explain the phenomenon of Corona and discuss the advantages, disadvantages and methods reducing the Corona effect. 06

**OR**

**Que. – 4** (A) What do you mean by a transformer substation? What are the different types of transformer substations? Illustrate your answer with suitable block diagram. 06

(B) Discuss the measurement of earth resistance with necessary diagrams and graphs. 03

(C) Find the corona loss for 3 phase, 132kV, 50Hz, 250km transmission line whose conductor Diameter is 1.35cm and power factor is 0.87 lagging. Spacing between conductor is 450cm. Surface irregularity factor is 0.88. 03

**Que. – 5** (A) What do you understand by induction regulators? Describe single phase and three phase induction regulators. 05

(B) A 3- phase overhead line has resistance and reactance per phase of 5 Ω and 20 Ω respectively. The load at the receiving end is 25 MW at 33 kV and a power factor of 0.8 lagging. Find the capacity of the synchronous condenser required for this load condition if it is connected at the receiving end and the line voltages at both ends are maintained at 33 kV. 06

**OR**

**Que. – 5** (A) Explain the methods of voltage control by using on load and off load tap changing transformer with suitable circuit diagrams. 05

(B) Design an earthing grid for a 220 kV substation. Soil resistivity 55 Ω-m. Fault current 5000A, substation area 47.50 X 31.5 m and resistivity of soil at surface is 3000 Ω-m. Assume suitable data. 06

**Que. – 6 Attempt any three:** 12

(A) Define substation and classify them in detail.

(B) Explain the measurement of soil resistivity using four probe method.

(C) Discuss Tirril regulator.

(D) Compare indoor and outdoor substations.

**END OF PAPER**