

Student Exam No:- _____

GANPAT UNIVERSITY
B.TECH SEM-V (ELECTRICAL)
REGULAR EXAMINATION DEC-2013
2EE 504:-ELECTRICAL POWER SYSTEM II

Time: 3 Hours

Total Marks:-70

- Instructions: - 1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

SECTION-I

- Q:1 (A) With neat diagram explain the complete A.C. system for distribution of electrical energy. [4]
- (B) A 3-wire d.c. distributor, 250 m long, is supplied at end P at 500/250 V and is loaded as under : [5]
Positive side : 20 A, 150 m from P ; 30 A, 250 m from P
Negative side : 24 A, 100 m from P ; 36 A, 220 m from P
The resistance of each outer wire is 0.02Ω per 100 m and the cross-section of the middle wire is one half that of the outer. Find the voltage across each load point.
- (C) What are the advantages of three wire distributor over two wire distributor? [3]

OR

- Q:1 (A) Describe briefly the different types of d.c. distributors and Derive an expression for the voltage drop for a uniformly loaded distributor fed at one end. [4]
- (B) A 2-wire d.c. distributor AB is fed from both ends. At feeding point A, the voltage is maintained as at 230 V and at B 235 V. The total length of the distributor is 200 metres and loads are tapped off as under : [5]
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 kilometre of one conductor is 0.3Ω , Calculate :
(i) currents in various sections of the distributor
(ii) minimum voltage and the point at which it occurs
- (C) Compare doubly fed distributor with singly fed distributor. [3]
- Q:2 (A) A single phase a.c. distributor AB 300 metres long is fed from end A and is loaded as under : [6]
(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 0.2Ω and 0.1Ω per kilometre. Calculate the total voltage drop in the distributor. The load power factors refer to the voltage at the far end.

- (B) A 1- Φ a.c. distributor AB is fed from end A and has a total impedance of $(0.2 + j 0.3)$ ohm. At the far end, the voltage $V_B = 240$ V and the current is 100 A at a p.f. of 0.8 lagging. At the mid-point M, a current of 100 A is tapped at a p.f. of 0.6 lagging with reference to the voltage V_M at the mid-point. Calculate the supply voltage V_A and phase angle between V_A and V_B . [5]

OR

- Q:2 (A) Non-reactive loads of 10 kW, 8 kW and 5 kW are connected between the neutral and the red, yellow and blue phases respectively of a 3-phase, 4-wire system. The line voltage is 400V. Calculate (i) the current in each line and (ii) the current in the neutral wire. [6]
- (B) A 3-phase, 4-wire distributor supplies a balanced voltage of 400/230 V to a load consisting of 30 A at power factor 0.866 lagging for R-phase, 30 A at power factor 0.866 leading for Y phase and 30 A at unity power factor for B phase. The resistance of each line conductor is 0.2Ω . 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. [5]

Q:3

Attempt any three:

- (A) Explain construction of Underground cable with necessary diagram. [12]
- (B) Derive the equation for dielectric stress in a single core cable.
- (C) Describe briefly how will you solve A.C. distribution problems.
- (D) The capacitances of a 3-phase belted cable are $12.6 \mu\text{F}$ between the three cores bunched together and the lead sheath and $7.4 \mu\text{F}$ between one core and the other two connected to sheath. Find the charging current drawn by the cable when connected to 66 kV, 50 Hz supply.

SECTION-II

- Q:4 (A) What is Corona? List out the factors affecting for corona and explain it. [6]
- (B) List out the types of bus bar arrangement for substation? Explain duplicate bus bar system. [6]

OR

- Q:4 (A) 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. [6]
- (B) What is substation? What is need of substation? List out importance points while laying out a substation. [6]

- Q:5 (A) Design an earthing grid for a 132kV substation. Soil resistivity $70 \Omega\text{m}$. Fault current 6000A, substation area $55 \times 45\text{m}$ and resistivity of soil at surface is $3000 \Omega\text{m}$. Assume suitable data. Calculate conductor diameter, length for required buried of the conductor at GPR. [6]

- (B) Explain induction regulator. [5]

OR

- Q:5 (A) A 12500 KVA load is supplied at a p.f. of 0.8 lagging by a 3- Φ transmission line whose voltage is to be maintained at 33 kV at both ends. Determine the capacity of the synchronous condenser to be installed at the receiving end. The impedance of the line is $(4 + j 12)$ ohms per phase. [6]

- (B) Explain pole mounted substation with line diagram. [5]

Q:6

Attempt following questions:

- (A) Comparison between indoor and outdoor substation. [12]
- (B) Explain on load tap changing transformer by necessary diagram.
- (C) Explain the method for measure the soil resistivity.
- (D) Discuss Step Potential, Touch Potential, Mesh Potential and GPR.

END OF PAPER
Best of Luck