Student Exam No:-_____

GANPAT UNIVERSITY
B.TECH SEM-V ELECTRICAL ENGINEERING
REGULAR EXAMINATION NOV- DEC 2016
2EE503: ELECTRICAL POWER SYSTEM -II

Time: 3 Hours **Total Marks:-60**

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

SECTION-I

Q:1 (A) Discuss method to locate point of minimum potential for distributor fed at both ends with equal voltage with necessary diagram. **(04)**

(B) With a neat diagram, explain the complete a.c. system for distribution of electrical energy. **(03)**

(C) A d.c distributor AB is fed at both ends. At feeding point A, the voltage is maintained at 235 V and at B at 236 V. The total length of the distributor is 200 meters and loads are tapped off from point A is as under: **(03)**
20 A at 50 m, 40 A at 75 m, 25 A at 100 m, 30 A at 150 m. The resistance per kilometer of one conductor is 0.4 ohm. Calculate the minimum voltage and point at which it occurs.

OR

Q:1 (A) A 250 m, 2-wire d.c. distributor fed from one end is loaded uniformly at the rate of 0·8 A per metre. The resistance of each conductor is 0·0002 Ω per metre. Find the necessary voltage at the feeding point to maintain 250 V at the far end of the distributor. **(05)**

(B) A 2-wire d.c. distributor AB is 300 metres long. The end A is fed at 205 V and end B at 200 V. The distributor is uniformly loaded at 0·15 A/metre length and has concentrated loads of 50 A, 60 A and 40 A at points distant 75, 175, 225 m respectively from the end A. The resistance of each conductor is 0·15 Ω per kilometre. Calculate : (i) the point of minimum potential (ii) currents fed at ends A and B **(05)**

Q:2 (A) Derive an expression for the voltage drop for a uniformly loaded distributor fed at one end. **(04)**

(B) Discuss the merits and demerits of underground and overhead distribution systems. **(03)**

(C) A single phase distributor 2 kilometres long supplies a load of 120 A at 0.8 p.f. lagging at its far end and a load of 80 A at 0.9 p.f. lagging at its mid-point. Both power factors are referred to the voltage at the far end. The resistance and reactance per km (go and return) are 0.05 Ω and 0.1 Ω respectively. If the voltage at the far end is maintained at 230 V. Calculate: (i) voltage at the sending end (ii) phase angle between voltages at the two ends. **(03)**

OR

Q:2 (A) A d.c. ring main ABCDA is fed from point A from a 250 V supply and the resistances (including both lead and return) of various sections are as follows : AB = 0·02 Ω ; BC = 0·018 Ω ; CD = 0·025 Ω and DA = 0·02 Ω. The main supplies loads of 150 A at B ; 300 A at C and 250 A at D. Determine the voltage at each load point. If the points A and C are linked through an interconnector of resistance 0·02 Ω, determine the new voltage at each load point. **(05)**

(B) A factory has the following loads with a power factor of 0·9 lagging in each case. Red phase 40 A, yellow phase 50 A and blue phase 60 A. If the supply is 400V, 3-phase, 4-wire, calculate the current in the neutral wire and the total power. **(05)**

Q:3 **Attempt the following questions:**

(A) Classify the conductors based on voltage level. Also explain the construction of cables. (04)

(B) A 33 kV, 50 Hz, 3-phase underground cable, 4 km long uses three single core cables. Each of the conductor has a diameter of 2·5 cm and the radial thickness of insulation is 0·5 cm. Determine (i) capacitance of the cable/phase (ii) charging current/phase (iii) total charging kVAR. The relative permittivity of insulation is 3. (04)

(C) What are the importance of voltage control? In practice, at which location voltage control equipment placed? (02)

SECTION-II

Q:4 (A) What is the effect of increase in length of cable on insulation resistance of a single core cable? Explain with necessary equation. (05)

(B) Make a comparison between outdoor substation and indoor substation. Draw the line diagram for pole mounted substation and explain it. (05)

OR

Q:4 (A) With a neat diagram, Explain the murray loop test to locate the earth fault in underground cables. (05)

(B) What are the different types of bus bar arrangements used in substation? Illustrate any one method with suitable diagrams. (05)

Q:5 (A) Define the term corona. Discuss the corona formation. What are the factors, which affect the corona, how? (05)

(B) Explain with a neat sketch: i) Off load tap changing transformer and ii) Auto transformer tap changing. (05)

OR

Q:5 (A) A 3 phase 220 KV, 50 Hz, transmission line consists of 1.5 cm radius conductor spaced 2 meters apart in equilateral triangular formation. If the temperature is 40^0 C and atmospheric pressure is 76 cm, calculate the corona loss per km of the line. Take m_0=0.85. (05)

(B) What do you understand by induction regulators? Describe single phase and three phase induction regulators. (05)

Q:6 **Attempt the following questions:**

(A) Design an earthing grid for 220KV substation. (05)
Soil Resistivity (ρ) = 55 Ω-m, Substation area = 47.50m X 31.50m
Max. grid current = 5000A, Fault clearing time = 0.5s.
Resistivity of Soil Resistivity = 3000 Ω-m.
Use steel conductor and welded joints.

(B) What is meant by "Let Go Current"? And discuss need of an earthing system. (03)

(C) Define the following terms : (02)
(a) Step Potential
(b) Touch Potential

END OF PAPER

Best of Luck