Seat No.: _____  Enrolment No. 

# GUJARAT TECHNOLOGICAL UNIVERSITY

**BE - SEMESTER–VIII EXAMINATION – SUMMER 2020**

**Subject Code: 2180903** **Date: 27/10/2020**

**Subject Name: Power System Planning and Design**

**Time:02.30 pm to 05.00 pm** **Total Marks: 70**

**Instructions:**

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

| | | | MARKS |
|---|---|---|---|
| **Q.1** | **(a)** | What are the limits of the charging current and charging KVA in the design of transmission line? | **03** |
| | **(b)** | Calculate the capacity of synchronous condenser require to improve the p.f. from 0.9 lag to 0.93 lag for 85000 KW receiving end load. | **04** |
| | **(c)** | Explain how the voltage and conductor is selected for the design of transmission line? | **07** |
| **Q.2** | **(a)** | For a certain long transmission line having impedance of 29.4+j73.2 ohms and admittance of 0+j0.000398 mho, find out the surge impedance and surge impedance loading if the line KV is 230 KV. | **03** |
| | **(b)** | What is Sag? How it is useful in the design of transmission line? | **04** |
| | **(c)** | Explain the steps to construct receiving end circle diagram. | **07** |
| | | **OR** | |
| | **(c)** | Explain the design considerations in EHV transmission line. | **07** |
| **Q.3** | **(a)** | What are the points to be considered for designing and developing distribution plan for any area ? | **03** |
| | **(b)** | Explain radial ,parallel and interconnected distribution system. | **04** |
| | **(c)** | A D.C. distributor 1000 mt long is fed from one end is loaded as under:- | **07** |

| Distance from feeding point in mt | 300 | 900 | 1000 |
|---|---|---|---|
| Load in Amp | 100 | 800 | 50 |

The resistance of each conductor is 0.03Ω/1000mt.Find the voltage at every load point if the voltage at feeding point is maintained at 250 V.

**OR**

| | | | |
|---|---|---|---|
| **Q.3** | **(a)** | How voltage at various loading points and voltage drop is calculated in single phase AC distributor fed from one end. | **03** |
| | **(b)** | Explain the methods of voltage regulation in distribution system. | **04** |
| | **(c)** | A single phase A.C. distributor has loop resistance of 0.3 ohm and reactance of 0.4 ohm. The far end of the distributor has a load current of 80 A at p.f. 0.8 lagging at 220 V. The midpoint of the distributor has a load current of 50 A at p.f. 0.707 lagging with reference to far end voltage. Calculate sending end voltage and power factor. | **07** |
| **Q.4** | **(a)** | What are the function of following equipments in substation? (1)Isolator (2) Lightning Arrestor (3) Earthling Switch. | **03** |
| | **(b)** | Explain the factors on which soil resistivity depends. | **04** |

| | | | |
|---|---|---|---|
| | **(c)** | Explain the main consideration in planning and designing generating stations in power system with reference to size of units and role of different types of power plant in large power system. | **07** |

**OR**

| | | | |
|---|---|---|---|
| **Q.4** | **(a)** | What is step and touch potential? | **03** |
| | **(b)** | Explain the insulation co ordination curve. | **04** |
| | **(c)** | Explain the design of earthling grid. | **07** |
| **Q.5** | **(a)** | Define (1) Dry flash over voltage (2)Wet flash over Voltage (3) Impulse flash over voltage. | **03** |
| | **(b)** | Explain the determination of line insulation. | **04** |
| | **(c)** | Explain the selection of Lightning Arrestor. | **07** |

**OR**

| | | | |
|---|---|---|---|
| **Q.5** | **(a)** | Discuss the method of Power system Planning with reference to Transmission Line Expansion. | **03** |
| | **(b)** | Discuss the methods of measuring Power System Reliability. | **04** |
| | **(c)** | Explain the methods of Power System Improvement with reference to improvement on L.T. side ,11 KV feeder , Shunt compensation , transformer capacity and augmentation of sub transmission line. | **07** |

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