Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VIII (NEW) - EXAMINATION – SUMMER 2017

Subject Code:2180903 **Date: 29/04/2017**

Subject Name: Power System Planning and Design

Time: 10.30AM to 01.00PM **Total Marks: 70**

Instructions:

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

Q.1 **(a)** Discuss the reasons for necessity of increasing transmission voltage to EHV and UHV range. **07**

(b) It is propose to transmit 100 MW at 0.9 p.f. lag over a distance of 200 Km. Voltage selected is 220KV. GOAT conductor 30/7/3.71 mm having nominal Cu area of 185 mm^2 ,resistance at 20^0 C is 0.08989 ohm/Km, current carrying capacity of 680 Amp. conductor diameter of 25.97 mm and α_0 is 0.004385 is selected. Choose horizontal configuration and 6 mt spacing between adjacent phase. and resistance is to be consider at 75^0 C. Take approx value of S.I. as 400 ohms .calculate **07**

1. Number of circuit require .
2. Z and Y of the line .
3. Charging KVA per phase

Q.2 **(a)** For 220 KV line steel tower, find out overall height of tower considering horizontal spacing of conductor and equivalent spacing of 10.2. mt. Normal span of 215 mt is used. Consider 16 suspension type insulators each of 25 cm diameter and disc spacing of 14.6 cm with respect to each other. Take sag as 3.5 mt. Assume supports are at equal level and minimum space between each wire and conductor for insulation level of 18000KV is taken as 9 mt. **07**

(b) Discuss the points to be considered for development of distribution plan for any particular area. **07**

OR

(b) Discuss the various methods of voltage regulation used in distribution system. **07**

Q.3 **(a)** Determine the total voltage drop of a single phase distributor loaded as under:-

Meters from feeding point :	100	250	400
Load in Amp with p.f. :	100 A at 0.707p.f.lag	120 A at u.p.f.	80A at 0.8 p.f.lag

The impedance is (0.25+j0.125) per Km run (go and return)

(b) Discuss the design of primary distribution system with respect to selection of voltage, choice of scheme and size of feeder. **07**

OR

Q.3 **(a)** Explain the main considerations in designing generating stations in power system with reference to following: **07**

1.Size of unit
2.Location of power station
3.Role of different power plants.

(b) A two wire 400 mt d.c. distributor is loaded as under:- **07**

Meters from feeding point:	100	200	275	325	400
Load in Amp :	25	10	30	50	20

If the resistivity of the conductor is 1.5×10^{-8} Ω-mt .what must be the cross

section of each conductor , in order that voltage drop may not exceed 10 V.

Q.4	**(a)**	Discuss the steps to be followed for the design of earthing grid.	**07**
	(b)	Define earth current ,step potential ,touch potential and mesh potential. Find earthing resistance of driven rod length 3 mt and diameter 2 cm if soil resistivity is 60 ohm-mt.	**07**

OR

Q.4	**(a)**	Explain the insulation co ordination curve . How the line insulation is determined?	**07**
	(b)	Discuss the reasons for which power frequency voltages which may appears across arrestor becomes greater than maximum operating phase to ground voltage.	**07**
Q.5	**(a)**	Explain the methods of power system improvement with reference to improvement on L.T. system,11 KV feeder , shunt compensation and new substation.	**07**
	(b)	Discuss the distribution system planning with distribution system planning model.	**07**

OR

Q.5	**(a)**	Discus the various methods of power system planning with reference to 1. Load forecasting. 2. Generation planning.	**07**
	(b)	Explain the financial benefit aspect of the power system improvement scheme.	**07**

****