

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VIII (NEW) EXAMINATION – WINTER 2018

Subject Code: 2180903

Date: 26/11/2018

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.

- Q.1**
- (a) Define the terms feeder, distributor and service mains. **03**
 - (b) Discuss the following with respect to design of transmission line. (1) Choice of voltage (2) Selection of conductor size **04**
 - (c) Explain classification of lamp flicker and remedies for reducing lamp flicker. **07**
- Q.2**
- (a) Define critical disruptive voltage and visual critical voltage. **03**
 - (b) Explain radio and television interference. **04**
 - (c) For 1- ϕ AC distributor A B C D of length 400m, determine the total voltage drop over the distributor if various currents tapped are as under. (1) At point B, 100m from A, 100amp at 0.707p.f. lagging (2) At point C, 250m from A, 120amp at UPF. (3) At point D, 400m from A, 80amp at 0.8p.f. lagging. Point A is feeding point and impedance is $(0.25+j0.125)$ per km run (go and return) **07**
- OR**
- (c) What is stringing chart? How the preliminary design of tower is carried out? **07**
- Q.3**
- (a) Define step potential, touch potential and transferred potential. **03**
 - (b) Discuss the following with respect to design of transmission line. (1) span and number of circuit (2) SIL **04**
 - (c) A 3 core distribution cable is 300m long and supplies a load of 100kW at 440volts at 0.9p.f. lag for 3000hours in a year. The cable cost including installation is Rs. $(13a+32)$ per meter where 'a' is the cross sectional area of each conductor in sq.cm. Cost of energy wasted is 12 paisa per unit and the rate of interest and depreciation is 15%. The resistance per km of the conductor of 1 cm² cross section is 0.213 Ω . Find the most economical cross – section of the distributor cable. **07**
- OR**
- Q.3**
- (a) Define earth electrode and earth current. **03**
 - (b) Compare radial – distribution system and ring – distribution system. **04**
 - (c) A 3 phase star connected system with 230V between each phase and neutral has resistances of 4 Ω , 5 Ω and 6 Ω respectively in three phases. Estimate the current flowing in each phase and the neutral current. Find the total power absorbed. **07**
- Q.4**
- (a) State limitations of Peek formula for calculating corona loss. **03**
 - (b) What are the design considerations for EHV transmission line? **04**
 - (c) Explain the factors while considering the size and locations of substation. **07**

OR

- Q.4** **(a)** Explain earthing grid. **03**
 (b) Enlist the steps to be followed for the construction of receiving end circle diagram. **04**
 (c) Discuss the power system improvement scheme in detail. **07**
- Q.5** **(a)** What is insulation coordination? **03**
 (b) Write a note on location of lightning arrester. **04**
 (c) Explain main considerations in planning and designing generating stations in power systems with reference to the following: (1) Size of units (2) Location of power stations. **07**

OR

- Q.5** **(a)** Define dry flash over voltage, wet flashover voltage and impulse flash over voltage. **03**
 (b) State limitations of Kelvin's law. **04**
 (c) Explain main considerations in planning and designing generating stations in power systems with reference to the following: (1) Role of different types of power plants in large power systems. (2) Choice of generator unit constants. **07**
