

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-V(NEW) EXAMINATION – SUMMER 2022

Subject Code:2150908

Date:20/06/2022

Subject Name:Electrical Power System – I

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.
4. Simple and non-programmable scientific calculators are allowed.

		MARKS
Q.1	(a) What are the advantages of overhead system for power transmission method.	03
	(b) Enlist names and use of different transmissioin line components.	04
	(c) Explain the advantages of EHV transmission with necessary derivations.	07
Q.2	(a) Why suspension type insulators are more preferred than pin type insulators.	03
	(b) Draw diagram of single circuit and double circuit steel towers with indication of different components.	04
	(c) State and explain Kelvin's law? What are the limitations of Kelvin's law.	07
	OR	
	(c) Which are the desirable properties of good conducting material? Why stranded conductors are used? What are the advantages of bundled conductors?	07
Q.3	(a) State classification of cables?	03
	(b) What should be the electrical and thermal properties of insulators used in transmission line?	04
	(c) Derive the equation of distribution of potential over a string of suspension insulators? Derive equation of string efficiency?	07
	OR	
Q.3	(a) Which are the methods to improve string efficiency?	03
	(b) Each line of three phase system is suspended by a string of 3 similar insulators. If the voltage across the line unit is 18 kV, calculate the line to neutral voltage. The shunt capacitance between each insulator and earth is $1/9^{\text{th}}$ of capacitance of the insulator itself. Find the string efficiency.	04
	(c) What is sag? Derive the equation of sag for supports at equal ground level?	07
Q.4	(a) Explain skin effect.	03
	(b) Explain Ferranti effect with vector diagram.	04
	(c) Derive the equation of inductance of three phase transmission line with conductors at equal spacing.	07
	OR	
Q.4	(a) Compare AC and DC distribution system.	03

- (b) Derive equation of capacitance of single phase two wire line. 04
- (c) Explain Radial, Ring main and Interconnected distribution system with necessary diagram. 07
- Q.5 (a) Discuss briefly design consideration of distribution system 03
- (b) State advantages of per unit system. 04
- (c) A single phase two wire distributor AC is loaded as follows: 120 Amp at 0.8 p.f. lag at point C and 60 Amp. at 0.8 p.f. lag at point B. The impedance of segment AB is $0.04+j0.08$ ohm, and that of BC is $0.08+j0.012$ ohm. If the voltage at the far end C is to be maintained 450 V, determine the voltage at A and B. 07

OR

- Q.5 (a) Explain the PU representation of transformer 03
- (b) What do you understand by the term grading of cable? 04
- (c) Explain construction of power cable with diagram. 07
