Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER–IV EXAMINATION – WINTER 2025

Subject Code:3140914 Date:26-11-2025

Subject Name: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)**	Define: 1) load factor, 2) Diversity factor, 3) Electricity tariff	**03**
	(b)	Draw configuration of bundle conductor and analyze effect of bundle conductor on transmission line.	**04**
	(c)	Differentiate Steam power station and Hydro power station	**07**
Q.2	**(a)**	Represent the transmission line 1) with distributed parameters 2) with lumped parameters.	**03**
	(b)	Explain various components of wind energy conversion system with diagram.	**04**
	(c)	Compare Stand-alone PV system configurations, and Grid-connected PV systems.	**07**
		OR	
	(c)	Draw Schematic arrangement of nuclear power station and explain function of each block.	**07**
Q.3	**(a)**	Explain the term transposition of conductors with diagram and necessity for transposition of conductors	**03**
	(b)	An overhead transmission line has a span of 220 m. The conductor weight is 0.7 kg/m. Calculate the maximum sag, if the ultimate strength of conductor is 5760 kg. Assume factor of safety equal to 2.	**04**
	(c)	Define sag in case of overhead transmission line. Derive expression to calculate sag when supports of transmission line are at equal Ground level	**07**
		OR	
Q.3	**(a)**	State and explain concept of internal flux linkage in case of overhead transmission line.	**03**
	(b)	Define and Explain String efficiency. State methods of improving string efficiency. Discuss any one.	**04**
	(c)	Each line of 3-phase system is suspended by a string of 3 similar insulators. If voltage across the line unit is 8KV, calculate the line to neutral voltage. The shunt capacitance between each insulator and earth is $1/9^{th}$of the self capacitance of insulator. Find the string efficiency.	**07**
Q.4	**(a)**	Explain self GMD and Mutual GMD	**03**
	(b)	Derive expression for capacitor of single-phase transmission line.	**04**
	(c)	In a 3-phase transmission line, three conductors are spaced at equal distance from each other i.e. 2.5 m. The diameter of conductor is 1.3 cm. find the inductance per km length of line.	**07**
		OR	
Q.4	**(a)**	Explain term “grading of cable”	**03**
	(b)	Apply concept of capacitance for grading of cable.	**04**

	(c)	Derive expression for inductance of Double circuit transmission line.	**07**
Q.5	**(a)**	Draw single line diagram of 66/11 kV substation label each equipment.	**03**
	(b)	Describe pole mounted transformer in particle application.	**04**
	(c)	Explain following 1) Voltage transformer earthing, 2) Grounding transformer.	**07**

OR

Q.5	**(a)**	Discuss disadvantage of low power factor.	**03**
	(b)	List the different methods of neutral grounding. Explain solid grounding with its advantage and disadvantages	**04**
	(c)	Evaluate an equation for most economical value of power factor which may be attained by a consumer.	**07**

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