Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER– IV(NEW) EXAMINATION – SUMMER 2023

Subject Code:3140914 Date:21-07-2023

Subject Name:Power System- I

Time:10:30 AM TO 01:00 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: Load factor, Demand factor and Diversity factor.	**03**
	(b)	Compare steam power plant, hydro power plant and nuclear power plant.	**04**
	(c)	Explain the steam power station with neat schematic diagram. Also discuss advantages and disadvantages of steam power station. Also write the points, which are considered during the site selection of steam power plant.	**07**
Q.2	**(a)**	What are the properties of insulating material for cables? Name some insulating materials used in cables.	**03**
	(b)	Discuss the comparison of overhead transmission system with underground transmission system.	**04**
	(c)	A synchronous motor improves the power factor of a load of 200 kW from 0.8 lagging to 0.9 lagging. Simultaneously the motor carries a load of 80 kW. Find (i) the leading kVAR supplied by the motor (ii) kVA rating of the motor and (iii) power factor at which the motor operates.	**07**
		OR	
	(c)	A 50 Hz overhead transmission line consisting of 3 conductors each of diameter 1.24 cm and spaced 2 m apart. Calculate the inductance per phase per km for the following arrangement between conductors: (1) Equilateral spacing (2) Horizontal spacing	**07**
Q.3	**(a)**	Compare indoor substation with outdoor substation.	**03**
	(b)	What do you understand by grading of underground cables? List the methods of grading and explain any one of them in detail.	**04**
	(c)	Calculate the capacitance of a 100 km long 3-phase, 50 Hz overhead transmission line consisting of 3 conductors, each of diameter 2 cm and spaced 2.5 m at the corners of an equivalent triangle.	**07**
		OR	
Q.3	**(a)**	Compare AC and DC supply system.	**03**
	(b)	What is neutral grounding? List the advantages of Neutral grounding.	**04**
	(c)	Explain methods of distribution systems with necessary diagrams.	**07**
Q.4	**(a)**	Enlist various equipment's used in substation.	**03**
	(b)	Differentiate between horizontal and vertical axis wind turbine.	**04**
	(c)	Explain Photovoltaic cell for electrical power generation. Write applications of solar energy.	**07**

OR

Q.4	**(a)**	Explain the advantages of high transmission line.	**03**
	(b)	Derive an expression for the capacitance of a single phase overhead transmission line.	**04**
	(c)	What is string efficiency? Explain methods of improving string efficiency.	**07**
Q.5	**(a)**	List out the main components of overhead lines. Also write the types of insulators.	**03**
	(b)	Explain the disadvantages of low power factor.	**04**
	(c)	Define the sag in overhead line. Derive the equation of sag in case of when supports are at equal and unequal level.	**07**

OR

Q.5	**(a)**	Define and explain string efficiency. Can its value be equal to 100%? Justify your answer.	**03**
	(b)	Define substation. Explain the classification of substation considering different ways.	**04**
	(c)	Draw block diagram of nuclear power station and explain working of nuclear station including chain reaction.	**07**

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