

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER- V (New) EXAMINATION – WINTER 2019

Subject Code: 2150908

Date: 21/11/2019

Subject Name: Electrical 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.

		MARKS
Q.1	(a) Define electric power supply system. Draw a single line diagram of a typical a.c. power supply system.	03
	(b) Represent per unit model of generator, transmission line and load.	04
	(c) List out the advantages and disadvantages of d.c transmission over a.c transmission?	07
Q.2	(a) What is Skin effect and proximity effect?	03
	(b) Explain function of insulator and discuss pin type insulator.	04
	(c) Define the sag in overhead line. Derive the equation of sag in case of When supports are at equal and unequal level. Also find the sag during effect of wind and ice loading.	07
	OR	
	(c) In a string of three units, the capacitance between each link pin to earth is 11 % of the capacitance of unit. Calculate the voltage across each unit and the string efficiency when the voltage across the string is 33 KV.	07
Q.3	(a) Write short note on bundle conductors.	03
	(b) What do you mean by transposition of line? What is its effect on the performance of the line?	04
	(c) Derive an expression for the inductance per phase for a 3-phase overhead transmission line when conductors are unsymmetrically placed but the line is completely transposed.	07
	OR	
Q.3	(a) Derive an expression for electric potential at a charged single conductor.	03
	(b) Calculate the inductance of each conductor in a 3-phase, 3-wire system when the conductors are arranged in a horizontal plane with spacing such that $D_{31} = 4 \text{ m}$, $D_{12} = D_{23} = 2 \text{ m}$. The conductors are transposed and have a diameter of 2.5 cm.	04
	(c) Derive the equation of Inductance of a single phase two wire system.	07
Q.4	(a) Explain self GMD and mutual GMD.	03
	(b) Derive the equation of Capacitance of a single phase line	04
	(c) A d.c. distributor AB is fed at both ends. At feeding point A, the voltage is maintained at 230 V and at B, it is 235 V. The total length of the distributor is 200 meters and loads are tapped off as under: 25 A at 50 m from A 50 A at 75 m from A 30 A at 100 m from A 40 A at 150 m from A The resistance per kilometer of one conductor is 0.3 ohm. Calculate the current in various sections of distributor and minimum voltage and the point at which it occurs.	07

- Q.4** (a) Describe briefly different types of d.c. distributors. **03**
(b) Give the difference between a.c and d.c distribution. **04**
(c) Derive an expression for line to neutral capacitance for a 3-phase overhead transmission line when conductors are unsymmetrically placed but the line is completely transposed **07**

- Q.5** (a) Give definition of per unit value. List out advantages of per unit system. **03**
(b) Explain the PU representation of transformer. **04**
(c) What should be the desirable characteristics of insulating materials used in cables? Briefly describe some commonly used insulating materials for cables. **07**

OR

- Q.5** (a) Give the classification of cables. **03**
(b) A single –core cable has a conductor diameter of 1c.m. and insulation thickness of 0.4cm. If the specific resistance of insulation is $5 \times 10^{14} \Omega\text{-cm}$, calculate the insulation resistance for a 2km length of cable. **04**
(c) Explain the steady state model of synchronous machine with diagram **07**

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