Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–V (NEW) - EXAMINATION – SUMMER 2017

Subject Code: 2150908 **Date: 03/05/2017**

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.**

			MARKS
Q.1		**Short Questions**	**14**
	1	Primary transmission is done by 3-phase .....wire a.c. system.	
	2	The economic size of conductor is determined by..... Law.	
	3	The potential across the various discs of suspension string is different because of ..... capacitance.	
	4	Cross-arms are used on poles or towers to provide ..... to the insulators.	
	5	A neutral plane is one where..... is zero.	
	6	If capacitance between two conductors of a 3-phase line is 4 μF, then capacitance of each conductor to neutral is..... .	
	7	The main consideration in the design of a feeder is the.....	
	8	A metallic sheath is provided over the insulation to protect the cable from..... .	
	9	If a cable of homogeneous insulation has maximum stress of 5 kV/mm, then the dielectric strength of insulation should be.....	
	10	Belted cables are generally used upto ..... kV.	
	11	For purely domestic loads,..... a.c. system is employed for distribution.	
	12	The greater the power to be transmitted, the ..... is the economic transmission voltage.	
	13	A booster is connected in ..... with the feeder.	
	14	If the length of a cable increases, its insulation resistance	
Q.2	**(a)**	Draw typical AC supply scheme and explain it in brief.	**03**
	(b)	Explain (i) pin-type insulators (ii) suspension type insulators.	**04**
	(c)	A d.c. 2-wire system is to be converted into a.c. 3-phase, 3-wire system by the addition of a third conductor of the same cross-section as the two existing conductors. Calculate the percentage additional load which can now be supplied if the voltage between wires and the percentage loss in the line remain unchanged. Assume a balanced load of unity power factor.	**07**
		OR	
	(c)	Compare conductor material for two wire DC system-midpoint earth with single phase two wire ac system with one conductor earthed (for overhead system).	**07**

Q.3	(a)	Define and explain the terms: feeder, distributor and service mains.	03
	(b)	Explain the following systems of distribution : (i) Ring main system (ii) Interconnected system	04
	(c)	Define the sag in overhead line. Derive the equation of sag in case of When supports are at equal level. Also find the sag during effect of wind and ice loading.	07

OR

Q.3	(a)	What do you understand by the constants of an overhead transmission line?	03
	(b)	Derive an expression for the voltage drop for a uniformly loaded distributor fed at one end.	04
	(c)	In a 33 kV overhead line, there are three units in the string of insulators. If the capacitance between each insulator pin and earth is 11% of self-capacitance of each insulator, find, (i) The distribution of voltage over 3 insulators and (ii) string efficiency.	07

Q.4	(a)	Define and explain 1. Skin effect 2. Proximity effect 3. Ferranti effect.	03
	(b)	Explain the use of rotary balancer in a 3-wire d.c. distribution system.	04
	(c)	Derive the equation for inductance of single phase two wire line.	07

OR

Q.4	(a)	Explain 1)Bundled conductors 2)Magnetic field induction	03
	(b)	Explain Electric potential of a long straight conductor.	04
	(c)	Derive equation for capacitance of single phase two wire line.	07

Q.5	(a)	What are the advantages of per unit system?	03
	(b)	Explain load capability curve with figure.	04
	(c)	A 2-wire d.c. distributor cable AB is 2 km long and supplies loads of 100A, 150A, 200A and 50A situated 500 m, 1000 m, 1600 m and 2000 m from the feeding point A. Each conductor has a resistance of 0·01 Ω per 1000 m. Calculate the p.d. at each load point if a p.d. of 300 V is maintained at point A.	07

OR

Q.5	(a)	Compare the merits and demerits of underground system versus overhead system.	03
	(b)	Explain the steady state model of synchronous machine with diagram.	04
	(c)	What is the most general criterion for the classification of cables? Draw the sketch of a single-core low tension cable and label the various parts.	07

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