BACHELOR OF ENGINEERING (ELECTRICAL ENGINEERING) SUPPLEMENTARY EXAM - 2018

(3RD YEAR 1ST SEM.)

POWER SYSTEM PLANNING AND DESIGN

Time: Three hours (50 marks for this part) Full Marks: 100

Use a separate Answer-Script for each part

		PART -I **Answer any three questions** **Two marks allotted for neat and to the point answers**	
1)	a)	Differentiate between (**any four**): (i) Tangent towers & deviation towers (ii) Single circuit line & double circuit line (iii) Pin insulators & suspension insulators (iv) PPL insulation & PVC insulation (v) Cadmium copper conductors & All Aluminum conductors	(4 x 4)
2)	a)	Calculate the clearance of the lowest conductor above ground for a 132 KV and 220 KV transmission line.	(3)
	b)	What are the characteristics of transmission line supports?	(5)
	c)	An overhead line over a hill side with a gradient of 1 in 20 is supported by two 30m high towers. The horizontal distance between the towers is 300m. the weight of each conductor is 1.492 kgf/m and the tension is 2200 Kgf. The lowest conductor is fixed 6m below the top of each tower. Find the clearance of the lowest point of conductor from the ground. Assume parabolic configuration.	(8)
3)	a)	What are the advantages of underground cables over overhead conductors?	(3)
	b)	Show that the insulation resistance of a cable varies inversely as the length.	(5)
	c)	What are the different types of fault in cable? How to identify them?	(8)
4)	a)	Explain demand factor, load factor and availability factor.	(6)
	b)	What do you mean by capital cost with respect to heads of expenditure in power management?	(6)
	c)	Explain the necessity of load forecasting.	(4)
5)		Write short notes on (**any two**):	(8 x 2)
	a)	Vibration in Overhead transmission line	
	b)	Losses in cable	
	c)	Primitive tariffs	

Ref. No. : Ex/EE/5/T/312/2018(S)

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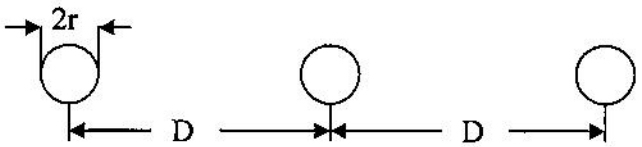
No. of Question		PART -II Answer any Three (Two marks reserved for well organized answers)	Marks
6)	a)	Derive the expression for capacitance per phase of a three phase unsymmetrical spaced but transposed overhead transmission line.	(8)
	b)	A three phase 50 HZ transmission line consists of three equal conductors of radii r, placed in a horizontal plane, with a spacing of 6 m between the middle and each outer conductor as shown in Fig.Q.6(b) below. Find the capacitance per kilometer to neutral and the capacitive reactance per phase per kilometer if the radii of each conductor are 12.5 mm.  Fig.Q.6(b)	(8)
7)	a)	Derive the inductance per unit length of an overhead transmission line due to external flux.	(6)
	b)	Calculate the inductive reactance per phase of the transposed line as shown in Fig.Q.6(b) above. All the data remaining same as in Q.6(b), derive its GMD and GMR equations.	(10)
8)	a)	Determine the inductance of a symmetrically spaced three phase overhead transmission line.	(8)
	b)	Explain incident voltage wave and reflected voltage wave in an overhead transmission line.	(8)
9)	a)	A 275 KV transmission line has the following characteristics: $Z = 12.5 + j66\Omega, Y = 4.4\times10^{-4}\angle90^0\,S$. Calculate the ABCD constants and surge impedance of the line.	(8)
	b)	If the line given in question 9(a) delivers 250 MW at a lagging power factor of 0.9, determine the sending end voltage, sending end current and efficiency of transmission.	(8)

(please turn over)

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10)	Write short notes on **any two** of the following: 1. Capacitance calculation of three phase double circuit line. 2. Skin effect and proximity effect. 3. Pi and T equivalent of long transmission line. 4. Effect of earth on transmission line capacitance.	(8×2)