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## The Mombasa Polytechnic University College

A Centre of Excellence

Department of Electrical & Electronic Engineering

EEE2	314	•	TRANSMISSION LINES	BSc(6R/6E)	TES	Γ1
October 25 <sup>TH</sup> 2012				TIME : 2 Hrs		
ATTE	EMPT	ALL (	QUESTIONS			
With reference to electric circuits distinguish between						
(i) Lumped circuit model						
(ii)	Distributed circuit model					(6 marks)
(b) (i) Distinguish between electrically long and electrically short structure						
(ii)	Consider a pair of lands 10cm long etched on a glass –epoxy board ( $\varepsilon_r = 4.7$ ).					
	Determine the time delay that a signal suffers as it propagates along these lands.					
(i)	Describe with the aid of appropriate sketches why it is necessary to either minimize or					
	eliminate time delay in signal transmission.					(8 marks)
Deterr	rmine the phase shift that a signal suffers as it propagates over a length of 10cm at					
(i)	1 GHz					
(ii)	2 GHz					
(iii)	3 GHz (6 marks					
a)	<ul> <li>Apply a step input into an infinitely long transmission line and w</li> <li>Sketches describe what happens as energy surges towards the</li> </ul>					appropriate
						nd of the line
	(ii)	Descr	ibe the scenario in (a) (i) assu	iming the line is t	erminated in a	l
		I.	Short circuit			
		II.	Open circuit			(9 marks)
b)	(i)	Define	e the term 'characteristic impe	dance'		
	(ii) Explain the importance of 'controlled impedance' boards and cables in RF design					
						(4 marks)
c)	A certain lossless coaxial cable has a characteristic impedance of $50\Omega$ and a velocity					
	factor $u = 0.63$ and a capacitance of $90pF/m$ . Determine					
	EEE2 Octob <u>ATTE</u> With r (i) (i) (i) (i) (i) (ii) (ii) (ii) (ii	EEE2314 October 25 <sup>T</sup> <u>ATTEMPT</u> With reference (i) Lump (ii) Distrik (i) Distrik (ii) Consi Deternine (ii) Consi Deternine (ii) Descr elimin Determine th (ii) 1 GH (ii) 2 GHz (ii) 3 GHz (ii) 3 GHz (ii) (ii) c) (i)	EEE2314 : October $25^{TH} 2012$ <u>ATTEMPT ALL (</u> With reference to el (i) Lumped circl (ii) Distributed c (i) Distinguish b (ii) Consider a p Determine the liminate tim Determine the phase (i) 1 GHz (ii) 2 GHz (ii) 2 GHz (ii) 3 GHz a) (i) Apply Sketc (ii) Descri l. l. l. b) (i) Define (ii) Expla	EEE2314:TRANSMISSION LINESOctober $25^{\text{TH}} 2012$ ATTEMPT ALL QUESTIONSWith reference to electric circuits distinguish between(i)Lumped circuit model(ii)Distributed circuit model(ii)Distributed circuit model(ii)Consider a pair of lands 10cm long etched(iii)Consider a pair of lands 10cm long etched(ii)Describe with the aid of appropriate sketceeliminate time delay in signal transmissionDetermine the phase shift that a signal suffers as(ii)2 GHz(iii)3 GHza)(i)Apply a step input into an infinitely I Sketches describe what happens a (ii)(ii)Describe the scenario in (a) (i) assuI.Short circuitII.Open circuitb)(i)Define the term 'characteristic imped (ii)Explain the importance of 'controllec)A certain lossless coaxial cable has a chara factor $u = 0.63$ and a capacitance of 90 plate	EEE2314 : TRANSMISSION LINES BSc(6R/6E) October 25 <sup>TH</sup> 2012 <u>ATTEMPT ALL QUESTIONS</u> With reference to electric circuits distinguish between (i) Lumped circuit model (ii) Distributed circuit model (i) Distinguish between electrically long and electrically short s (ii) Consider a pair of lands 10cm long etched on a glass –epo Determine the time delay that a signal suffers as it propaga (i) Describe with the aid of appropriate sketches why it is ne eliminate time delay in signal transmission. Determine the phase shift that a signal suffers as it propagates ov (i) 1 GHz (ii) 2 GHz (iii) 3 GHz a) (i) Apply a step input into an infinitely long transmission Sketches describe what happens as energy surges (ii) Describe the scenario in (a) (i) assuming the line is the I. Short circuit II. Open circuit b) (i) Define the term 'characteristic impedance' (ii) Explain the importance of 'controlled impedance' bo c) A certain lossless coaxial cable has a characteristic imped factor $u = 0.63$ and a capacitance of $90pF/m$ . Determine	EEE2314:TRANSMISSION LINESBSc(6R/6E)TESTOctober $25^{TH}$ 2012TIME : 2 EATTEMPT ALL QUESTIONSWith reference to electric circuits distinguish between(i)Lumped circuit model(ii)Distributed circuit model(ii)Distributed circuit model(ii)Distributed circuit model(ii)Consider a pair of lands 10cm long etched on a glass -epoxy board ( $\varepsilon_r$ =Determine the time delay that a signal suffers as it propagates along thes(i)Describe with the aid of appropriate sketches why it is necessary to eith eliminate time delay in signal transmission.Determine the phase shift that a signal suffers as it propagates over a length of(ii)1 GHz(iii)2 GHz(iii)3 GHza)(i)Apply a step input into an infinitely long transmission line and with Sketches describe what happens as energy surges towards the er (ii)(iii)Describe the scenario in (a) (i) assuming the line is terminated in a I. Short circuit II. Open circuit(ii)Define the term 'characteristic impedance' (ii)(iii)Explain the importance of 'controlled impedance' boards and cable(c)A certain lossless coaxial cable has a characteristic impedance of $50\Omega$ factor $u = 0.63$ and a capacitance of $90pF/m$ . Determine

- (i) The wave velocity on this cable in cm/nanosecond
- (ii) inductance and capacitance per unit length of the cable
- (iii) The wavelength on the cable at a frequency of 1.2GHz
- (iv)  $\lambda/4$  wavelength section of the cable 7 marks)
- 3. Explaining each step and justifying any assumptions made show that the voltage and current along a transmission line is given by the following expressions

$$\hat{V}(z) = V_{3}^{+} e^{-\gamma z} + V_{0}^{-} e^{\gamma z}$$

$$\hat{I}(z) = \frac{V_{0}^{+}}{z_{0}} e^{-\gamma z} - \frac{V_{0}^{-}}{z_{0}} e^{\gamma z}$$
(20 marks)