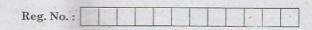
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Question Paper Code: 80344

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2016.

Fifth Semester

Electronics and Communication Engineering

EC 6503 — TRANSMISSION LINES AND WAVE GUIDES

(Regulations 2013)

Time: Three hours

Maximum: 100 marks

(Normalized Smith chart is to be provided)

Answer ALL questions.

PART A — $(10 \times 2 = 20 \text{ marks})$

- 1. What is meant by distortionless line?
- 2. Find the Characteristic impedance of a line at 1600 HZ if $Z_{oc} = 750 \angle -30^{\circ} \Omega$ and $Z_{sc} = 600 \angle -20^{\circ} \Omega$.
- Write the expression for the input impedance of open and short circuited dissipationless line.
- 4. Calculate Standing Wave Ratio and Reflection Coefficient on a line having the characteristic impedance $Z_0=300\,\Omega$ and terminating impedance in $Z_R=300+j400\,\Omega$.
- Distinguish between Single Stub and Double Stub matching in a transmission line.
- 6. Give the application of eight wave line.
- 7. A constant-K, T-section high pass filter has a cut off-frequency of 10 KH and the design impedance is 600 Ω . Determine the value of shunt inductance L and series Capacitance C.
- Define propagation constant in a symmetrical network.
- 9. Justify, why TMo1 and TM10 modes in a rectangular waveguide do not exit.
- 10. An air-filled rectangular waveguide of inner dimensions 2.286 × 1.016 in centimeters operates in the dominant TE₁₀ modes. Calculate the cut-off frequency and phase velocity of a wave in the guide at a frequency of 7 GHz.

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PART B — $(5 \times 16 = 80 \text{ marks})$ Explain in detail about the reflection on a line not terminated by its 11. (a) characteristic impedance Zo. Derive the condition for minimum attenuation in a distortionless Or A Communication line has L = 3.67 mH/km, G = 0.08 × 10-6 mhos/km, C = 0.0083 µF/km and R = 10.4 ohms/km. Determine the characteristic impedance, propagation constant, phase constant, velocity of propagation, sending end current and receiving end current for given frequency f = 1000 HZ, Sending end voltage is 1 volt and transmission line length is 100 kilometers. 12. (a) Derive an expression for the input impedance of a dissipationless line and also find the input impedance is maximum and minimum at a distance 's'. (ii) Find the sending end line impedance for a HF line having characteristic impedance of 50 Ω . The line is of length (1.185 λ) and is terminated in a load of $(110 + j80)\Omega$. Describe an experimental set up for the determination of VSWR of an RF transmission. Briefly explain on : (ii) Standing Waves Reflection loss. Determine length and location of a single short circuited stub to (a) (i) produce an impedance match on a transmission line with characteristic impedance of 600 Ω and terminated in 1800 Ω . (8) Explain the operation of quarter wave transformer and mention it's important applications. Find the sending end impedance of a line with negligible losses when characteristic impedance is 55 Ω and the load impedance is 115 + j75 Ω length of the line is 1.183 wave length by using smith chart.

 (ii) Explain the significance of smith chart and its application in a transmission lines.

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14.	(a)	What is m-Derived filter? Draw a m-Derived T-section a π -section low pass filter and explain the analysis of m-Derived low p filter with respect to attenuation, phase shift and characteristimpedance with frequency profile respectively.	ass
	(b)	What is composite filter? Design a constant-K-low pass filter (T-sect and π -section) and having cut-off at which 2.5 KHz and design resistant R ₀ is 700 Ω . Also find the frequency at which this filter product attenuation of 19.1 dB. Find its characteristic impedances and physiconstant at pass band and stop or attenuation band. (2+	nce ces ase
15.	(a)	Derive an expression for the transmission of TE waves between para perfectly conducting planes for the field components.	llel 16)
		Or	
	(b)	(i) Write a brief note on circular cavity resonator and its application.	(8)
		(ii) A TE ₁₁ wave is propagating through a circular waveguide. The diameter of the guide is 10 cm and the guide is air-filled. Give X ₁₁ = 1.842.	'he
		(1) Find the cut-off frequency.	(3)
		(2) Find the wavelength λ_g in the guide for a frequency	of
		3 GHz.	(2)
		(3) Determine the wave impedance in the guide.	(3)
		3 803	44