Q. Code: 486861

Reg. No. | | | | | | | | | |

B.E. / B.TECH. DEGREE EXAMINATIONS, DEC 2019

Fifth Semester

EC16503 – TRANSMISSION LINES AND WAVE GUIDES

(Electronics and Communication Engineering)

(Regulation 2016)

Time: Three Hours **Maximum : 100 Marks**

Answer **ALL** questions

PART A - (10 X 2 = 20 Marks)

		CO	RBT
1.	Find the characteristic impedance of a line at 1000 Hz if $Z_{oc} = 650\angle -30^0\ \Omega$ and $Z_{sc} = 300\angle 70^0\ \Omega$.	1	U
2.	Sketch the equivalent circuit of a unit length of transmission line.	1	R
3.	Write the expression for the input impedance of open and short circuited dissipation less line.	1	R
4.	Express standing wave ratio in terms of reflection co-efficient.	1	R
5.	Why shorted circuited stub is preferred to open circuited stub?	2	U
6.	A 75Ω lossless transmission line is to be matched to a resistive load impedance of $Z_L = 100\Omega$ via a quarter wave section. Calculate the characteristic impedance of the quarter-wave transformer.	2	AP
7.	Mention the condition for pass band and stop band of a filter.	3	R
8.	Compare constant-K and m-derived filters.	3	U
9.	Which is the dominant mode of a rectangular wave guide? Why?	4	U
10.	Mention the applications of resonant cavities.	4	R

PART B - (5 X16 = 80 Marks)

11.	(a)	(i)	Derive the general solution of a transmission line.	(10)	1	R
		(ii)	A transmission has the following constants R= 10.4Ω, L= 3.666mH, C= 0.00835μF and G= 0.08μmhos. Calculate its characteristic impedance, attenuation, phase constant and phase velocity.	(6)	1	AP
			(OR)			
	(b)	(i)	Discuss the theory of open and short circuited lines with voltage and current distribution diagrams and also derive the input impedance expression.	(10)	1	U
		(ii)	A low loss transmission line of 100 ohms characteristic impedance is connected to a load of 200 ohm. Calculate the reflection co-efficient and the standing wave ratio.	(6)	1	AP

12.	(a)	(i)	Explain and 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’.	**(10)**	**1**	**U**
		(ii)	Discuss the various parameters of the open wire and coaxial line at high frequencies.	**(6)**	**1**	**R**
			(OR)			
	(b)	(i)	Briefly explain on: (1) Standing waves (2) Reflection loss	**(4 + 4)**	**1**	**R**
		(ii)	Describe an experimental set up for the determination of VSWR and wavelength of RF line.	**(8)**	**1**	**R**
13.	(a)		Explain the technique of single stub matching and derive the length and location of the stub with suitable diagram.	**(16)**	**2**	**U**
			(OR)			
	(b)	(i)	A 75Ω transmission line is connected to a load impedance of 150 + j225Ω at 500MHz. Find the position and length of a short circuited stub required to match the line using smith chart.	**(10)**	**2**	**AN**
		(ii)	Explain the significance of smith chart and its application in transmission lines.	**(6)**	**2**	**U**
14.	(a)	(i)	Draw and explain the design and operation of constant-K T-section bandpass filter with necessary equations and diagrams.	**(8)**	**3**	**U**
		(ii)	Design constant-K T-section bandpass filter for the cutoff frequencies 2KHz and 6KHz and the design impedance is 500Ω.	**(8)**	**3**	**AP**
			(OR)			
	(b)		Derive and draw the m-derived T and π section for low pass and high pass filter.	**(16)**	**3**	**R**
15.	(a)		Derive the expression for the field strengths for TE wave between a pair of parallel perfectly conducting planes of infinite extent in the X and Y directions. The plates are separated in Z direction by ‘a’ meter.	**(16)**	**4**	**AP**
			(OR)			
	(b)		Explain the propagation of electromagnetic waves in a cylindrical waveguide with suitable expressions.	**(16)**	**4**	**U**