Reg. No.:						+ :					
	1 '						l	l .			

Question Paper Code: 91409

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2014.

Fifth Semester

Electronics and Communication Engineering

EC 2305/EC 55/10144 EC 504 — TRANSMISSION LINES AND WAVEGUIDES

(Regulation 2008/2010)

(Common to PTEC 2305 – Transmission Lines and Waveguides for B.E. (Part-Time) Fourth Semester Electronics and Communication Engineering – Regulation 2009)

Time: Three hours

Maximum: 100 marks

(Smith chart is to be provided)

Answer ALL questions.

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

- 1. What is constant K filter? Why it is called prototype filter section?
- 2. A prototype LPF is to be designed which must have $R_o = 600 \Omega$, $f_c = 1 \text{ KHz}$. Find filter elements [L and C].
- 3. Define wavelength of the line.
- 4. What is the significance of reflection coefficient?
- 5. List parameters of the open wire line at high frequencies.
- 6. A line having characteristic impedance of 50Ω is terminated in load impedance $(75 + j75)\Omega$. Determine the reflection coefficient.
- 7. Why is TEM mode not supported by waveguide?
- 8. State the significance of dominant mode of propagation.
- 9. A rectangular waveguide with a $5 \text{ cm} \times 2 \text{ cm}$ cross is used to propagate TM_{11} mode at 10 GHz. Determine the cut off wave length.
- 10. Mention the applications of resonant cavities.

PART B — $(5 \times 16 = 80 \text{ marks})$

11. (a) Design a constant K band pass filter derving expressions for the circuit components. A constant K highpass filter cuts off at a frequency of 2300 Hz. The load resistance is 500Ω . Calculate the values of components used in the filter.

Or

- (b) Design a composite high pass filter to operate into a load of 600Ω and have a cut off frequency of 1.2 KHz. The filter is to have one constant k section, one m-derived section with f = 1.1KHz and suitably terminationed half section. Discuss the merits and demerits of m-derived filter and crystal filter.
- 12. (a) Obtain the expression for current and voltage at any point along a line which is terminated in Z_a .

Or

- (b) For a transmission line terminated in Z_o , prove that $Z_o = \sqrt{Z_{SC}.Z_{OC}}$. The following measurement are made on a 25 km line at a frequency of 796 Hz. $Z_{SC} = 3220 \left[-79.29^{\circ} \ \Omega, Z_{OC} = 1301 \right] \left[76.67^{\circ} \ \Omega \right]$. Determine the primary constants of the line.
- 13. (a) Explain the parameters of open wire line and coaxial cable at RF.

 Mention the standard assumptions made for radio frequency line.

 \mathbf{Or}

- (b) A line having characteristic impedance of $50\,\Omega$ is terminated in load impedance [75 + j75] Ω . Determine the reflection coefficient and voltage standard wave ratio. Mention the significance and application of Smith chart.
- 14. (a) Derive the field expressions for transmission of TE waves between Parallel Planes.

Or

- (b) Explain the following:
 - (i) Attenuators
 - (ii) Characteristic impedance.

15. (a) A rectangular air filled copper waveguide with a a = 2.28 cm and b = 1.01 cm cross section and l = 30.48 cm is operated at 9.2 GHz with a dominant mode. Find the cut off frequency, guide wavelength, phase velocity and characteristic impedance.

Or

- (b) Explain the principles of the following:
 - (i) Excitation of waveguides.
 - (ii) Guide termination and resonant Cavities.

3 91409

