

**B.E. / B.Tech Degree Examination, December 2015/January 2016**

**Fifth Semester**

**Electronics and Communication Engineering**

**EC 2305/EC 55/10144 EC 504 – TRANSMISSION LINES AND  
WAVEGUIDES**

**Time : Three Hours**

**Maximum : 100 Marks**

**Smith Chart can be provided.**

**Answer ALL Questions**

**Part A – (10 × 2 = 20 Marks)**

1. What are the disadvantages of constant-K filter?
2. Draw the equivalent circuit for a piezoelectric crystal.
3. Define wavelength of the line.
4. What is the significance of reflection coefficient?
5. Write the expression for VSWR in terms of
6. The reflection coefficient.
7. VSWR in terms of  $Z_L$  and  $Z_0$ .
  - a) Mention the significance of  $\lambda/4$  line.
  - b) What is degenerate mode in rectangular waveguide?
8. State the Characteristic of TEM waves.
9. A rectangular waveguide with  $a = 7$  cm and  $b = 3.5$  cm is used to propagate TM is at 3.5GHz. Determine the guided wave length.
10. Write the applications of cavity resonators.

**Part B – (5 × 16 = 80 Marks)**

11. a) i) Derive the expression for characteristic impedance of symmetrical T and  $\pi$  section networks.  
ii) Bring out the relation between Decibel and Neper.

(OR)

- b) Obtain the design equation for m derived Band pass and Band elimination filters.
12. a) i) Obtain the general solution of transmission lines.  
ii) A telephone cable 64 KM long has the resistance of 13 Ohm/km and capacitance of 0.008 micro F/km. Calculate attenuation constant, velocity and wave length of line at 1000 Hz.

(OR)

- b) i) Explain about different types of transmission lines.  
ii) Discuss the following: reflection loss and return loss.
13. a) Explain the parameters of open wire line and coaxial cable at RF. Mention the standard assumptions made for radio frequency line.

(OR)

- b) A line having characteristic impedance of  $50 \Omega$  is terminated in load impedance  $(75 + j75)\Omega$ . Determine the reflection coefficient and voltage standing wave ratio. Mention the significance and application of Smith chart.
14. a) Explain the concept of transmission of TM waves and TEM waves between parallel plates.

(OR)

- b) i) Derive the relation among phase velocity, group velocity and free space velocity.  
ii) Design a T and  $\pi$  type attenuators to give attenuation of 20 dB and to work in a line of  $600 \Omega$ .
15. a) i) Describe the propagation of TE waves in a rectangular waveguide with a necessary expressions for the field components.  
ii) An air filled rectangular waveguide of dimensions  $a = 4.5$  cm and  $b = 3$  cm operates in the  $TM_{11}$  mode. Find the cut off wave length and characteristic wave impedance at frequency of 9GHz.

(OR)

- b) i) Explain briefly the propagation of TM waves in a circular waveguide with necessary expressions for the field components.  
ii) Give a brief note on excitation of modes in rectangular waveguides.