PVP 14

Code: EC5T2

III B.Tech - I Semester – Regular/Supplementary Examinations
October 2018

TRANSMISSION LINES AND WAVE GUIDES
(ELECTRONICS & COMMUNICATION ENGINEERING)

Duration: 3 hours Max. Marks: 70

PART – A

Answer ***all*** the questions. All questions carry equal marks

11x 2 = 22 M

1. a) Draw the equivalent circuit of a two-wire transmission line and list the applications of transmission line.
   b) Derive the secondary constants for a low loss transmission line.
   c) What are the types of loading?
   d) Define and Express the terms Characteristic impedance and input impedance.
   e) A 100 + j 150 Ω load is connected to a 75 Ω lossless line. Find Γ.
   f) List the applications of smith chart.
   g) Design a quarter wave transformer to match a line having impedance 75 Ω to a load of 25 Ω.
   h) Mention the dominant modes in rectangular and circular waveguides.
   i) Give the characteristics of TEM waves.
   j) Define cut-off wavelength in a wave guides.
   k) Mention the applications of cavity resonators.

PART – B

Answer any ***THREE*** questions. All questions carry equal marks.
3 x 16 = 48 M

2. a) A 25m long lossless transmission line is terminated with a load having an equivalent impedance of 40 + j 30 Ω at 10 MHz. the per-unit length inductance and capacitance of the line are 310.4 nH/m and 38.28 pF/m, respectively. Calculate the input impedance at the sending-end and the mid point of the line. Also plot the variations of the magnitude of the input impedance and its angle as a function of location on the transmission line. 10 M

   b) Describe the losses in transmission lines. 6 M

3. a) Determine the condition for lossless transmission line and give the impedances of short circuited and open-circuited at the termination of transmission line. 8 M

   b) Find the Characteristic impedance, propagation constant and velocity of propagation at f =100 KHz for a lossless transmission line having L= 33 μH/m and C= 10 nF/m. 8 M

4. a) Explain the significance and utility of λ/8, λ/4 and λ/2 lines. 6 M

b) A load of 50 – j 100 Ω is connected across a 50 Ω line. Design a short-circuited stub in order to provide impedance matching between the two at a signal frequency of 30 MHz using smith chart. 10 M

5. a) Describe the conditions of the field vectors at the boundary surface between different media. 8 M

b) Discuss about the power losses in wave guide and summarize the necessary expressions. 8 M

6. a) A circular waveguide operating in the dominant mode at a frequency of 9 GHz with maximum field strength of 300 V/cm. the internal diameter is 5cm. calculate the maximum power. 8 M

b) Derive the equations for resonant frequencies (f_0) for rectangular and circular cavity resonators. 8 M