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

Question Paper Code : 65095

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

(Regulations 2008/2010)

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

Time : Three hours Maximum : 100 marks

(Smith chart is to 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

   (a) The reflection coefficient

   (b) VSWR in terms of z_L and z_O.

6. Mention the significance of $\frac{\lambda}{4}$ line.

7. What is degenerate mode in rectangular waveguide?

8. State the characteristics of TEM waves.

9. A rectangular waveguide with $a = 7$ cm and $b = 3.5$ cm is used to propagate TM_{10} at 3.5 GHz. Determine the guided wavelength.

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 Π section networks. (12)

(ii) Bring out the relation between Decibel and Neper. (4)

Or

(b) Obtain the design equations for *m*-derived

(i) Bandpass

(ii) Band elimination filters.

12. (a) (i) Obtain the general solution of transmission line. (10)

(ii) A telephone cable 64 km long has a resistance of 13 Ω/km and a capacitance of 0.008 μF/km. Calculate attenuation constant, velocity and wavelength of the line at 1000 Hz. (6)

Or

(b) (i) Explain about the different types of transmission line. (8)

(ii) Discuss the following : reflection loss and return loss. (8)

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 50Ω 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) Explain the concept of transmission of TM waves and TEM waves between parallel plates. (16)

Or

(b) (i) Derive the relation among phase velocity, group velocity and freespace velocity. (8)

(ii) Design a T and π type attenuators to give attenuation of 20 dB and to work in a line of 600 Ω. (8)

15. (a) (i) Describe the propagation of TE waves in a rectangular waveguide with necessary expressions for the field components. (12)

(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 wavelength and characteristic wave impedance at a frequency of 9 GHz. (4)

Or

(b) (i) Explain briefly the propagation of TM waves in a circular waveguide with necessary expressions for the field components. (10)

(ii) Give a brief note on excitation of modes in rectangular waveguides. (6)
