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

Question Paper Code : 52450

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2017
Fifth Semester
Electronics and Communication Engineering
EC2305 – TRANSMISSION LINES AND WAVE GUIDES
(Regulations 2008)
[Common to PTEC2305 – Transmission Lines and Wave guides for BE (Part – Time) Fourth Semester – ECE – Regulations 2009]

Time : Three Hours | Maximum : 100 Marks

Answer ALL questions

PART – A **(10×2=20 Marks)**

1. What are the secondary constants of a line ?
2. What are called constant-k filters ?
3. What is the condition for a distortion less line ?
4. Draw the input impedance pattern for a lossless line when short circuited.
5. What is the relationship between standing wave ratio and reflection coefficient ?
6. What are the assumptions for the analysis of radio frequency line ?
7. What are the dominant modes for TE and TM waves in parallel plane wave guide ?
8. Write the expression for cutoff wavelength of the wave which is propagated in between two parallel planes.
9. Define – Phase Velocity and Group Velocity.
10. What are the characteristics of TEM waves ?

PART – B **(5×16=80 Marks)**

11. a) Sketch the reactance curve of a constant-K low pass filter. Determine attenuation constant and phase constant in pass band and stop band plot it. **(16)**

(OR)

b) Design a m-derived low pass filter (T and π section) having a design resistance of $R_0 = 500\,\Omega$ and the cut off frequency (f_c) of 1500 Hz and an infinite attenuation frequency (f_∞) of 2000 Hz. **(16)**

12. a) Derive the general transmission line equations (with necessary diagrams) for voltage and current at any point on a line. **(16)**

(OR)

b) A generator of 1V, 1000 Hz supplies power to 1000Km long open wire line terminated in its characteristic impedance Z_0 and having the following parameters. $R = 15\,\Omega$, $L = 0.004$ H, $C = 0.008\,\mu$ F, $G = 0.5\,\mu$ mhos. Calculate the characteristic impedance, propagation constant and the phase velocity. **(16)**

13. a) Antenna with impedance $40+j30\,\Omega$ is to be matched to a $100\,\Omega$ lossless line with a shorted stub. Determine the required stub admittance, distance between the stub, stub length and standing wave ratio on each ratio of the system using Smith chart. **(16)**

(OR)

b) A lossless transmission line with characteristic impedance $Z_0 = 300\,\Omega$ is connected to a load $Z_L = 120 - j60\,\Omega$. Calculate input impedance (Z_{in}), standing wave ratio, Γ (Reflection coefficient) and input current. Given, length of the transmission line = 2 m, phase velocity (vp) = 2.5×10^8m/s, operating frequency (f) = 100 MHz, source impedance (Z_s) = $300\,\Omega$ and source voltage (V_s) = 60V. **(16)**

14. a) Obtain the field equations of Transverse Electric waves in parallel planes. **(16)**

(OR)

b) i) Design a symmetrical bridge T attenuator with an attenuation of 40 dB and impedance of $600\,\Omega$. **(10)**

ii) Differentiate between attenuator and amplifier. List the practical applications of attenuators. **(6)**

15. a) Derive the field equations of Transverse Electric waves travelling in Z direction in a rectangular wave guide. **(16)**

(OR)

b) Derive the resonant frequency of a rectangular resonator. **(16)**