B.E./B.TECH. Degree Examination, December 2020

Fifth Semester

**EC18504 - TRANSMISSION LINES AND WAVEGUIDES**

(Regulation 2018)

Time: Three hours Maximum : 80 Marks

Answer **ALL** questions

**PART A - (8 X 2 = 16 marks)**

1. The characteristic impedance of a transmission line with impedance and admittance of 16 and 9 respectively is
   a) 25
   b) 1.33
   c) 7
   d) 0.75
2. The leakage current in the transmission lines is referred to as the
   a) Resistance
   b) Radiation
   c) Conductance
   d) Polarisation
3. Which primary parameter is uniformly distributed along the length of the conductor?
   a) G
   b) C
   c) L
   d) R
4. A filter that passes all frequencies lying outside a certain range, while it attenuates all frequencies between the two designated frequencies is called?
   a) low pass filter
   b) high pass filter
   c) band elimination filter
   d) band pass filter
5. How transmission line could be modeled using T sections?
6. Find L and C of air spaced coaxial line having b/a=10 at 40 Megacycles.
7. Differentiate free space wavelength and guide wavelength.
8. Discuss on the significance of dominant modes and specify the mode for rectangular waveguide.

**PART B - (4 X16 = 64 marks)**

9. (a) Design m-derived Low pass filter(both T and π section)having $R_o$= 500Ω,cutoff frequency 1500 Hz and frequency of infinite attenuation at 2000Hz **( 16 )**

**(OR)**

(b) Elaborate on the significance of characteristic impedance, attenuation and phase shift values in the design of filters. **( 16 )**

10. (a) The characteristic impedance of a 805 km long line is 94 ∟-23.2 ˚Ω,the value of attenuation constant is 74. X $10^{-6}$ N and phase shift constant is 174x $10^{-6}$ rad/m at 5 KHz. Calculate the primary constants and the phase velocity. **( 16 )**

**(OR)**

(b) Derive and discuss on the parameters of a transmission lines. **( 16 )**

11. (a) Justify that voltages and currents on a transmission line at high frequencies ensures dissipationless transmissions. **( 16 )**

**(OR)**

(b) A generator of 1V/1KHz supplies power to a 100km transmission line terminated in 200Ω resistance. The line parameters are R=10Ω/km, L=3.8mH/km, G=1μ℧/km,C=0.0085μF/km.Calculate the input impedance,VSWR,$V_{max}$ ,$V_{min}$ and reflection coefficient. **( 16 )**

12. (a) An antenna as a load on the transmission line produces standing waves with SWR 2.8 where $V_{min}$ occurs at 0.12λ from antenna terminals. Find antenna impedance, reflection factor and reflection loss at antenna if Ro =300Ω for the line. **( 16 )**

**(OR)**

(b) Derive the smith chart equations and elaborate on the axes in it. **( 16 )**