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|  |  | Transmission Lines     **Q 1. For a quarter wavelength ideal transmission line of characteristic impedance 50 ohm and load impedance 100 ohm , calculate the input impedance.**    https://docs.google.com/document/pubimage?id=1ekWg27mciU42vKWvHZWZChWPh21WP6LUufOegmz67ac&image_id=1Jk1CVn73BV5q1P6IuYeFvvloc8zPHQ    **Q 2. Calculate the characteristic impedance of a transmission line having inductance https://docs.google.com/document/pubimage?id=1ekWg27mciU42vKWvHZWZChWPh21WP6LUufOegmz67ac&image_id=1JOwHmw0wRweO7cs8whOr5lB6V9h7Rgand capacitance https://docs.google.com/document/pubimage?id=1ekWg27mciU42vKWvHZWZChWPh21WP6LUufOegmz67ac&image_id=1fei5nvKRAWq9oKS9kbtQTNiB_IE_5w**      https://docs.google.com/document/pubimage?id=1ekWg27mciU42vKWvHZWZChWPh21WP6LUufOegmz67ac&image_id=1eC0z9XGWRBsE8mZzpb6X4xcSphU2Gg        **Q 3. Explain the meaning of terms  reflected wave and standing wave ratio?**    **OR**    **What is standing wave ratio in transmission line and how is it measured?**    **Ans.**  **(i)** The voltage or current wave proceeding from receiving end towards sending with decreasing aEnplitude as it moves away from load is the reflected voltage or current.    **(ii)** Standing wave ratio in transmission line is the ratio of maximum to minimum magnitude current or voltage which having standing wave.  https://docs.google.com/document/pubimage?id=1ekWg27mciU42vKWvHZWZChWPh21WP6LUufOegmz67ac&image_id=1gstxpsOVy2GJCfjMiF6rX5zJXP1CAg  and Standing wave occurs when a transmission line is terminated in a resistive load other than characteristic impedance (Z0).  SWR is measured by connecting RF voltmeter across the line.      **Q 4. What is the mode of propagation in a co-axial?**  **Ans.**  TEM (Transverse electromagnetic waves) is the mode of propagation in a coaxial cable.      **Q 5. What is a Smith chart?**    **Ans.**   * Smith chart is one of the graphical representations of the various properties of transmission lines. * It gives the impedance relations along a lossless line for different load conditions. * It consists of two set of circles, or arc of circles arranged such that various important quantities of mismatched transmission lines are measured.     **Q 6. Define VSWR?**  **Ans.**  **VSWR:** The ratio of maximum to muitmum voltage on a transmission line Which having standing waves is voltage standing wave ratio  https://docs.google.com/document/pubimage?id=1ekWg27mciU42vKWvHZWZChWPh21WP6LUufOegmz67ac&image_id=18194JfB1sIL6JhdHiGFbIh5ryIhXSA      **Q 7.Write an expression of the capacitance and inductance for parallel plate transmission line?**    **Ans.**  https://docs.google.com/document/pubimage?id=1ekWg27mciU42vKWvHZWZChWPh21WP6LUufOegmz67ac&image_id=1lblfTPoscsPecI2YXuqjDv7Hzqqbsg      **Q 8. Write down the equation for propagation constant for transmission line in terms of transmission line parameters?**    https://docs.google.com/document/pubimage?id=1ekWg27mciU42vKWvHZWZChWPh21WP6LUufOegmz67ac&image_id=1ZeGf8zMuLKQlqqMlHlu1bK9XVlAOwQ      **Q 9 Define propagation constant**  **Ans.** **Propagation constant**  https://docs.google.com/document/pubimage?id=1ekWg27mciU42vKWvHZWZChWPh21WP6LUufOegmz67ac&image_id=1oHVLYa9hl83boyZY16ZVM4qDhK_AKA      **Q 10. A signal of 10 V is applied to a 50 12 coaxial transmission line terminated in a 200 12 load.**  **Find**  **(a) the voltage reflection coefficient and**  **(b) the magnitude of the reflected voltage**    **Ans.**  The voltage reflection coefficient ;  https://docs.google.com/document/pubimage?id=1ekWg27mciU42vKWvHZWZChWPh21WP6LUufOegmz67ac&image_id=1kqN5bp_mLOKhAw9Gv4h0qf49u0Y5Ug  https://docs.google.com/document/pubimage?id=1ekWg27mciU42vKWvHZWZChWPh21WP6LUufOegmz67ac&image_id=1S6OW_mEHIfcLpk4amPYdMXekWjJqew        **Q 11. Find the input, impedance of the distortionless transmission line at radio frequencies in both open circuited and short circuited cases.**  **Ans.**  **(i)** Open circuited transmission line:  Let the wave travelling in x-direction at any point on the line  https://docs.google.com/document/pubimage?id=1ekWg27mciU42vKWvHZWZChWPh21WP6LUufOegmz67ac&image_id=18JpH4oqSZFLrdRcOFzastTL__NSDvg  https://docs.google.com/document/pubimage?id=1ekWg27mciU42vKWvHZWZChWPh21WP6LUufOegmz67ac&image_id=17tx6L6TWb2lfqkAt-LVAF9hsAh-3tw  https://docs.google.com/document/pubimage?id=1ekWg27mciU42vKWvHZWZChWPh21WP6LUufOegmz67ac&image_id=1XEn9wWKLTDYWyvYkjz1nLUHER_Bb1g  https://docs.google.com/document/pubimage?id=1ekWg27mciU42vKWvHZWZChWPh21WP6LUufOegmz67ac&image_id=1z0PhRW2xtt0iwINOdipPhaLUcjK_xQ  https://docs.google.com/document/pubimage?id=1ekWg27mciU42vKWvHZWZChWPh21WP6LUufOegmz67ac&image_id=1b9ogKpk9s-VNPatmy5XpTTcgbafGsg  https://docs.google.com/document/pubimage?id=1ekWg27mciU42vKWvHZWZChWPh21WP6LUufOegmz67ac&image_id=1tTvWqqFptFhfkJEkETKEQLat-m0Z4w    **Q 12. An open wire r f transmission line, which may be regarded as loss-free has characteristic impedance Z0 of 600ohm and is connected to a resistive load of 25ohm  .Find the position and length of a short circuited stub of the same constriction, which would enable the main length of the line to be correctly terminated at a frequency of 150 MHz?**    https://docs.google.com/document/pubimage?id=1ekWg27mciU42vKWvHZWZChWPh21WP6LUufOegmz67ac&image_id=1quYvZIPI9f6KrPQsDmPm_wIo6nhZ5Q  https://docs.google.com/document/pubimage?id=1ekWg27mciU42vKWvHZWZChWPh21WP6LUufOegmz67ac&image_id=1diAyuDz5Uze-5wX8SiTcxzJGzYg51A        **Q 13. Give the circuit representation of parallel plane transmission lines. Obtain the transmission line parameters for low frequencies?**  **Ans.**  **Circuit representation**  https://docs.google.com/document/pubimage?id=1ekWg27mciU42vKWvHZWZChWPh21WP6LUufOegmz67ac&image_id=1xkAyt8FMBAip-3crZEGLNUjTQ9IocQ  Transmission line parameters for low frequencies:  The parameters are resistance, inductance, capacitance and leakage capacitance-Resistance  https://docs.google.com/document/pubimage?id=1ekWg27mciU42vKWvHZWZChWPh21WP6LUufOegmz67ac&image_id=1jaI96ohtCyN8uV0sInXEeSNTSwQV2g  Inductance: Consider an open wire line having two circular conductor parallel to each other and each conductor having radius a and of distance d.  The self inductance is given by:  https://docs.google.com/document/pubimage?id=1ekWg27mciU42vKWvHZWZChWPh21WP6LUufOegmz67ac&image_id=1MI5ELiP7NK1FW6DdJNo9p5mQB5ZTCg  Capacitance of the wire line:  The voltage drop from conductor 1 to conductor 2 is:  https://docs.google.com/document/pubimage?id=1WrNx-dGmhj7oo11VW8MZ99fs8OhTVev0HHcz8N9KCdI&image_id=1QT-ILmVHhntpBX63Qrgtxrcdi8gqGw  https://docs.google.com/document/pubimage?id=1WrNx-dGmhj7oo11VW8MZ99fs8OhTVev0HHcz8N9KCdI&image_id=1e8XSG-49FUqzMDlTd40Qq5AsHnkRsA        **Q 14. Write note on the following: Distortion less condition in transmission lines.**    **Ans.**  **Distortion less condition in transmission lines**  The condition on is R = G = 0  At radio frequencies (RE), the inductive reactance is much layer than the resistance and so also the capacitive susceptance in compansori to the shut conductance Hence at radio frequencies R and G both are neglected The result in a line to be loss less  https://docs.google.com/document/pubimage?id=1WrNx-dGmhj7oo11VW8MZ99fs8OhTVev0HHcz8N9KCdI&image_id=1Daj9BF6PjlP6Cw5SYKoa7X_uOIyXlw      **Q 15. Write note on the following:**  **UHF transmission lines.**    **OR**    **Discuss the use of UHF lines as circuit elements**  **Ans.**  **UHF transmission line:**   * It covers frequency range from 300 to 300 Mhz. * Coaxial cable of waveguides come under the category of UHF lines. * At UHF range, ohmic and dielectric losses may be appreciable but since the physical length of line is small, the effect of losses is usually disregarded. * UHF line can be considered loss less if only short lengths are taken. * UHF lines can be come resonant at particular frequencies when the far end is open or short circuited. * They are used as ‘feeder lines’ to radio transmitted and in measurement of permeability, power factor of ‘dielectrics, impedance and as circuit elements.     **Q 16. In a lossless transmission line, the velocity of propagation is 2.5 x 108 m/s. Capacitance of the line is https://docs.google.com/document/pubimage?id=1WrNx-dGmhj7oo11VW8MZ99fs8OhTVev0HHcz8N9KCdI&image_id=1hco03XuylnNxJXA34139cwukBXxCXA**  **Find**  **(i) inductance of the line**  **(ii) phase constant 100 MHz.**  **(iii) characteristic impedance of the line.**  **https://docs.google.com/document/pubimage?id=1WrNx-dGmhj7oo11VW8MZ99fs8OhTVev0HHcz8N9KCdI&image_id=1EB9fa-7IMULjZ7D8RHrPZki3x315yA**      **Q 17. Discuss the properties of standing wave pattern.**  **Ans.**  Standing wave of incident and reflected wave are shown in fig.  https://docs.google.com/document/pubimage?id=1WrNx-dGmhj7oo11VW8MZ99fs8OhTVev0HHcz8N9KCdI&image_id=1vXfwu6kuCxu66VPzewcfqLtR7-yPLA  This wave appears to be stand still on the line, oscillating in magnitude with time bit having fixed position of maximal and minimal.        **Q 18.The transmission line of characteristic impedance of 50ohm is terminated with a load of 100+j100 ohm Find the reflection coefficient and SWR.**    https://docs.google.com/document/pubimage?id=1WrNx-dGmhj7oo11VW8MZ99fs8OhTVev0HHcz8N9KCdI&image_id=1X7yYlLs_X5fMhbgptLwdibXXeas-sQ      **Q 19. A transmission line with characteristic impedance of 5 ohms is terminated by a load impedance of 15-j20 ohms Determine with the help of Smith chart**  **(a) VSWR**  **(b) Reflection coefficient**  **(C) Distance of first voltage minima of the standing wave pattern from the load**  https://docs.google.com/document/pubimage?id=1WrNx-dGmhj7oo11VW8MZ99fs8OhTVev0HHcz8N9KCdI&image_id=1RPU_6HpfWutO6LFIyXg6HzyjdhLEhg  By extent the line OA towards retection coetticient circle. It cuts the circle at point C..  rhis gives the angle of reflection coefficient.  (iii) Voltage minima point is the point at left hand side where circle cross the horizontal e.    **Q 20. If**  **https://docs.google.com/document/pubimage?id=1WrNx-dGmhj7oo11VW8MZ99fs8OhTVev0HHcz8N9KCdI&image_id=1MPvPuyl12VX1wm99LWu-Aj30GaOAUw**  **find VSWR.**    https://docs.google.com/document/pubimage?id=1WrNx-dGmhj7oo11VW8MZ99fs8OhTVev0HHcz8N9KCdI&image_id=12v17T-8uJXv4UmVEGyGhB5Xt_iB7wA    **Q 21. Why two wire line is not used for microwaves?**    **Ans.**  Two wire line is not used for microwaves because conductors of system is radiate if separation of two conductors approach half wave length at the operating frequency.    **Q 22. What are the primary and secondary line constants?**    **Ans.**  R, L, G and C are called as primary line constants.  https://docs.google.com/document/pubimage?id=1WrNx-dGmhj7oo11VW8MZ99fs8OhTVev0HHcz8N9KCdI&image_id=1Ol7bVn3K5JMCv7fmlqp0Q8-uvrW4Lg    **Q 23. How primary constants exist in transmission line?**    **Ans.**   * Resistance (R) exists throughout the length of transmission line. * Distributed inductance (L) throughout the line as current passing through the conductor creates magnetic flux. * Leakage conductance (G) exist as the dielectric material or insulator is not always perfect. * Capacitance (C) exist as dielectric medium occur free conductors of transmission line.     **Q 24. Prove that RC = GL is distortionless condition transmission line.**    **Ans.** Characteristics equation of transmission line is  https://docs.google.com/document/pubimage?id=1WrNx-dGmhj7oo11VW8MZ99fs8OhTVev0HHcz8N9KCdI&image_id=192bNJCGwqFfIKSsXMwDdSy4Tr2hMDg  https://docs.google.com/document/pubimage?id=1WrNx-dGmhj7oo11VW8MZ99fs8OhTVev0HHcz8N9KCdI&image_id=1Xny17c7D3Wb__CSV_ej0vvtLnR65ug      **Q 25. Derive the expression for standing wave ratio in terms of reflection coefficient in a transmission line?**    **Ans.**  The maximum voltage is obtained if incident and reflected waves are in phase and add up directly The minimum voltage is obtained if incident and reflected waves are out of phase and subtracted directly  https://docs.google.com/document/pubimage?id=1WrNx-dGmhj7oo11VW8MZ99fs8OhTVev0HHcz8N9KCdI&image_id=1Dz6F1f8Rkq9SCt_vufn9q8aEojMGdw    **Q 26. Derive the expression for the reflection and transmission coefficients for an uniform plane wave incidence normally on the planer interface between two unbounded medium.**    **Ans.**  **Reflection Coefficients :** It is defined as the ratio of the reflected voltage or current to the incident voltage and it is denoted by https://docs.google.com/document/pubimage?id=1WrNx-dGmhj7oo11VW8MZ99fs8OhTVev0HHcz8N9KCdI&image_id=1KaTHnIMm075e-8MJ17Y7i8bt_dBqGw  https://docs.google.com/document/pubimage?id=1WrNx-dGmhj7oo11VW8MZ99fs8OhTVev0HHcz8N9KCdI&image_id=1YdlOyXAco2YXT8YAdJg1GMX8bsiWeA |