Reg. No. \_\_\_\_\_\_\_\_\_\_\_\_\_



**End Semester Examination – Nov / Dec – 2019**

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| **Code :** | **14EC2007** | **Duration :** | **3hrs** |
| **Sub. Name :** | **TRANSMISSION LINES AND WAVE GUIDES** | **Max. Marks :** | **100** |

**ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)**

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| **Q. No.** | **Sub Div.** | **Questions** | **Course**  **Outcome** | **Marks** |
| 1. | a. | Develop the general transmission line equations for voltage and current at any point on a transmission line. | CO1 | 14 |
| b. | Interpret the general solutions of the transmission line and list its physical significance in terms of infinite line. | CO1 | 6 |
| **(OR)** | | | | |
| 2. |  | Explain the concept of lumped loading and determine the propagation constant value of a line section consisting of partially lumped and partially distributed elements. | CO1 | 20 |
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| 3. |  | A 50 Ω transmission line is connected with a load impedance of 25-j75 Ω. Find the length and location of the shunt short circuit stub required to match the 50 Ω lines. | CO2 | 20 |
| **(OR)** | | | | |
| 4. |  | A lossless transmission line with a characteristic impedance of 50 ohms is terminated in a load of 50 +j50 ohms. Using smith chart find the following:  i) VSWR ii) Load admittance  iii) Magnitude and angle of reflection coefficient at load.  iv) Source Impedance at λ/4 distance from the load  v) Position of 1st voltage minimum from the load. | CO2 | 20 |
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| 5. | a. | Formulate the electric and magnetic field components from Maxwell’s equation, assuming the wave’s propagation is along the z-direction in a parallel plate waveguide structure. | CO3 | 14 |
| b. | Make use of the general field equations in a TE mode of a parallel plate waveguide and sketch its field pattern for the dominant mode. | CO3 | 6 |
| **(OR)** | | | | |
| 6. | a. | Derive the attenuation factor of a TEM mode in a parallel plate waveguide, whose field components are:  Hy = Ce-jβz  Ex = βC/ωε[e-jβz] | CO3 | 10 |
| b. | Compare the mode characteristics of TE, TM and TEM mode. | CO3 | 10 |
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| 7. |  | A TM20 mode wave is propagated through the region between two conducting planes at 5GHz. If the distance of separation is 6.25 cm and if the region between the planes is filled with a dielectric material of ɛr = 1.6, μr = 1. Find the following:  i) Cut-off frequency ii) Cut-off wavelength iii) Phase velocity  iv) Group velocity v) Phase constant vi) Wave impedance  vii) Is the propagation of TM30 mode is possible or not? | CO3 | 20 |
| **(OR)** | | | | |
| 8. | a. | Explain the characteristics equations of TE and TM waves in rectangular waveguides. | CO3 | 12 |
| b. | Briefly discuss, why TEM wave is impossible in rectangular waveguides. | CO3 | 8 |
|  | | **Compulsory**: |  |  |
| 9. | a. | Explain the need for cavity resonators at microwave frequencies. Identify their characteristic parameters, merits and limitations. | CO3 | 12 |
| b. | Discuss the types of planar transmission lines. | CO3 | 8 |