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

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**End Semester Examination – Nov/Dec – 2018**

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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. | A 50 mile line has the following measurements made at 1200 C: Zoc = 200∟-420 Ω and its Zsc = 1890∟220 Ω. Find the value of its characteristic impedance. | CO1 | 2 |
| b. | Develop the general transmission line equations for voltage and current at any point on a transmission line. | CO1 | 14 |
| c. | Interpret the general solutions of the transmission line and list its physical significance in terms of infinite line. | CO1 | 4 |
| (OR) | | | | |
| 2. | a. | Explain the concept of lumped loading and determine the propagation constant value of a line section consisting of partially lumped and partially of distributed elements. | CO1 | 15 |
| b. | Infer on the various distortion existing in an ordinary transmission line. | CO1 | 5 |
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| 3. | a. | Relate standing wave ratio with reflection coefficient. | CO2 | 5 |
| b. | Derive the input impedance of a λ/8 and λ/2 lines and hence analyze its applications. | CO2 | 15 |
| (OR) | | | | |
| 4. |  | A 50 Ω transmission line is connected to with a load impedance of  25-j50 Ω. Find the length and location of the shunt short circuit stub required to match the 50 Ω line. | CO2 | 20 |
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| 5. |  | Derive the electric and magnetic field components (Ex and Hy) from Maxwell’s equation, assuming the wave is propagation is along the z-direction in a parallel plate waveguide structure. | CO2 | 20 |
| (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]  Is the propagation of TM30 mode is possible or not? | CO2 | 10 |
|  | b. | The separation between the parallel plates of a waveguide is 3 cm. It is filled with a dielectric with relative permittivity of 4. The signal frequency is 6GHz. Find all propagating modes. For each of the propagating modes calculate the following:  i) Cut off frequency ii) Cut off wavelength | CO2 | 10 |
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| 7. |  | Develop the expression of the fields for TM waves in a rectangular waveguides. Also discuss about its dominant mode. | CO3 | 20 |
| (OR) | | | | |
| 8. |  | Utilize the concept of a rectangular waveguide and derive the general expression for the following parameters:   1. Cut-off frequency 2. Velocity of propagation 3. Phase velocity 4. Phase constant 5. Guide wavelength 6. Wave impedance | CO3 | 20 |
|  | |  |  |  |
|  | | **Compulsory**: |  |  |
| 9. |  | Examine the geometry and uses of the following waveguide structures:   1. Circular waveguide 2. Resonators 3. Coplanar Waveguides 4. Microstrip Lines | CO3 | 20 |