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**UNIVERSITY**

(Karunya Institute of Technology & Sciences)

(Declared as Deemed-to-be University under Sec.3 of the UGC Act, 1956)

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

**End Semester Examination – Nov/Dec - 2016**

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|  |  | **Semester :** | **2016-17 ODD** |
| **Code :** | **11EC212/EC280** | **Duration :** | **3 hrs** |
| **Sub. Name:** | **TRANSMISSION LINES AND WAVEGUIDES** | **Max. marks :** | **100** |

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| **Q. No.** | **Questions** | **Marks** |
| **PART-A(10X1=10 MARKS)** | | |
| 1. | \_\_\_\_\_\_\_\_\_\_ is the ratio of voltage to current at any point along the transmission line. | (1) |
| 2. | Which type of transmission line reduces phase distortion at radio frequencies? | (1) |
| 3. | Define Standing wave ratio. | (1) |
| 4. | \_\_\_\_\_\_\_\_\_\_\_ is the center point in a Smith Chart. | (1) |
| 5. | Give the dominant mode in a parallel plate waveguide. | (1) |
| 6. | What is the wave impedance of a TEM mode when propagating in free space? | (1) |
| 7. | List the modes present in a rectangular waveguide. | (1) |
| 8. | If the cut off frequency for a TE10 mode is 4GHz and if the signal is propagating at 3GHz. Comment on the mode propagation. | (1) |
| 9. | Define the cut off frequency in a resonator. | (1) |
| 10. | Give the dominant mode in a rectangular cavity resonator. | (1) |

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| **PART B(5 X 3= 15 MARKS)** | | |
| 11 | If R=.0071ohm/m, L=2.277 micro henry/metre and C=5.10 pico farad/metre, calculate its characteristic impedance of the transmission line operating at 100 MHz. Also the line is assumed to transmit with negligible leakage. | (3) |
| 12 | Calculate the standing wave ratio and reflection coefficient on a line having characteristic impedance Z0 = 75 Ω and terminated in ZR = (22.5 +j30) Ω. | (3) |
| 13 | List the characteristics of TEM wave. | (3) |
| 14 | Why TEM mode does not exist in a rectangular waveguide? | (3) |
| 15 | Discuss about the rectangular cavity resonator and its dominant mode. | (3) |

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| **PART C(5 X 15= 75 MARKS)** | | | |
| 16. |  | Obtain the general equations of voltage and current for the equivalent transmission line and write its physical significance. | (15) |
| (OR) | | | |
| 17. | a. | Observe the distortion in an ordinary telephone cable. How could it be eliminated? | (8) |
| b. | Derive the T-section equivalent of a transmission line. | (7) |
| 18. | a. | The VSWR measured on UHF transmission line, working at a frequency of 300 MHz is found to be 2. If the distance between load and voltage minimum is 0.8 m, calculate the value of load impedance. | (7) |
| b. | Derive the input impedance of a half wave line. | (8) |
| (OR) | | | |
| 19. |  | An R.F transmission line with a characteristic impedance of 0∘ is terminated in an impedance of -45∘ ohms. This load is to be matched to the transmission line by using a short circuited stub. With the help of smith chart determine the length and its distance from the load. | (15) |
| 20. |  | Derive the general solution of waves between parallel planes of waveguides. | (15) |
| (OR) | | | |
| 21. |  | A pair of perfectly conducting planes is separated by 8 cm in air. For a frequency of 5GHz with TM10 mode excited, find the following:  (a) Cut off frequency (b) Characteristic impedance  (c) Phase constant (d) Phase and group velocity  (e) Guide wavelength | (15) |
| 22. |  | Derive the electric and magnetic field equations for a TE wave of a rectangular waveguide. Also sketch the field configuration of its dominant mode. | (15) |
| (OR) | | | |
| 23. |  | Derive the attenuation factor of a TM wave of a rectangular waveguide. | (15) |
| 24. | a. | Sketch the field configuration of TM01, TM02 and TM11 waves of a circular waveguide. | (8) |
| b. | Discuss about mode excitation in circular waveguide. | (7) |
| (OR) | | | |
| 25. |  | Derive the Q factor of a TE101 mode of a rectangular cavity resonator. | (15) |

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