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



**UNIVERSITY**

(Karunya Institute of Technology & Sciences)

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

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

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|  |  | **Semester :** | **2016-17 ODD** |
| **Code :** | **14EC2022** | **Duration :** | **3hrs** |
| **Sub. Name :** | **Microwave and Optical Communication** | **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. | Describe the operation of Magic Tee and derive its scattering matrix. | CO1 | 15 |
| b. | Write short notes on waveguide corner. | CO1 | 5 |
| (OR) | | | | |
| 2. | a. | Explain the operation of circulator by using two directional couplers and two phase shifters. | CO1 | 15 |
| b. | With neat diagram, explain the operation of Faraday rotation isolator. | CO1 | 5 |
| 3. | a. | Explain the operation of reflex klystron with functional diagram and applegate diagram. | CO3 | 15 |
|  | b. | Compare two cavity klystron and travelling wave tube amplifier. | CO3 | 5 |
| (OR) | | | | |
| 4. | a. | With neat circuit diagram, elucidate the M type microwave vacuum tube which is used in microwave oven. | CO3 | 20 |
| 5. | a. | Describe the operating principle of IMPATT diode with neat physical structure diagram and waveforms. | CO3 | 20 |
| (OR) | | | | |
| 6. | a. | Elucidate the operating principle of TRAPATT diode with neat physical structure diagram and waveforms. | CO3 | 20 |
| 7. | a. | What is numerical aperture? Derive the expression for numerical aperture with a neat diagram. | CO2 | 15 |
|  | b. | A light wave is travelling in a semiconductor medium (GaAs) of refractive index 3.6. It is incident on a different medium (AlGaAs) of refractive index 3.4 and the angle of incidence is 80°. Will this result in total internal reflection? | CO2 | 5 |
| (OR) | | | | |
| 8. | a. | What is attenuation in an optical fiber? Explain the different types of attenuation. | CO2 | 15 |
|  | b. | Write short notes on dispersion. | CO2 | 5 |
|  | | **Compulsory:** |  |  |
| 9. | a. | What is the relationship between bandgap energy of a semiconductor laser and the wavelength of light emitted by it? | CO3 | 3 |
|  | b. | Calculate the band gap energy for a GaAs semiconductor laser if the wavelength of laser emitted by it is 0.4141 μm. | CO3 | 3 |
|  | c. | What are homojunction and heterojunction semiconductor lasers? | CO3 | 4 |
|  | d. | Explain the principle, construction and working of a semiconductor laser with necessary energy level diagram. | CO3 | 10 |

ALL THE BEST