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



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

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| **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. | Explain the properties of scattering matrix and derive the scattering matrix of E plane tee. | CO1 | 15 |
| b. | Summarize the functions of waveguide corner and waveguide bend in the microwave network. | CO1 | 5 |
| **(OR)** | | | | |
| 2. | a. | Show that in Faraday rotation isolator, output power is available at port 2 when input is given to port 1 and there is no power available due to reflection at port 1. | CO1 | 15 |
| b. | Justify that it is impossible to construct a perfectly matched, lossless, reciprocal three port junction. | CO1 | 5 |
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| 3. | a. | Categorize microwave vacuum tubes and analyze how the microwave signal gets amplified in travelling wave tube amplifier in detail. | CO2 | 15 |
| b. | Compare two cavity klystron amplifier and travelling wave tube amplifier. | CO2 | 5 |
| **(OR)** | | | | |
| 4. | a. | Explain the operation of reflex klystron with necessary diagrams and illustrate the formation of different modes when the repeller voltage is adjusted. | CO2 | 15 |
| b. | Make use of electron trajectory and explain the effect of magnetic field on electrons in cylindrical magnetron. | CO2 | 5 |
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| 5. | a. | Discuss the construction and operation of Gunn diode with necessary diagrams. | CO2 | 15 |
| b. | Summarize the microwave power measurements. | CO2 | 5 |
| **(OR)** | | | | |
| 6. | a. | Interpret the operating principle of TRAPATT diode with neat physical structure diagram and waveforms. | CO2 | 15 |
| b. | Compare IMPATT with TRAPATT diodes. | CO2 | 5 |
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| 7. | a. | Outline the fundamental elements of optical fiber communication system with neat block diagram and comment on why optical fiber communication is preferred nowadays rather than electrical communication. | CO3 | 15 |
| b. | Calculate the numerical aperture and acceptance angle for an optical fiber of which the refractive index of core is 1.6 and refractive index of cladding is 1.5. | CO3 | 5 |
| **(OR)** | | | | |
| 8. | a. | Elaborate the types of optical fiber based on refractive index profile and modes of transmission of light with suitable illustrations. | CO3 | 15 |
| b. | Estimate the angle of refraction at the air-core interface, critical angle, incidence angle at the core-cladding interface when nair=1 ncore=1.46, ncladding =1.43 and angle of incidence at air-core interface is 12°. | CO3 | 5 |
|  | | **Compulsory**: |  |  |
| 9. | a. | Discuss the principle, construction and working of Light Emitting Diode(LED) in detail. | CO3 | 15 |
| b. | List the requirements of photodetectors. | CO3 | 5 |