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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 :** | **12EC243** | **Duration :** | **3 hrs** |
| **Sub. Name:** | **MICROWAVE &OPTICAL COMMUNICATION ENGINEERING** | **Max. Marks:** | **100** |

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| **Q. No.** | | **Questions** | | **Course outcome** | **Marks** | |
| **PART-A(10X1=10 MARKS)** | | | | | | |
| 1. | | Define transit time. | | CO2 | 1 | |
| 2. | | Mention any two microwave sources. | | CO2 | 1 | |
| 3. | | What is waveguide corner? | | CO2 | 1 | |
| 4. | | What are the types of attenuators used in microwave communication? | | CO2 | 1 | |
| 5. | | What is the importance of using helical structure in TWTA? | | CO3 | 1 | |
| 6. | | What is the application of GUNN diode? | | CO2 | 1 | |
| 7. | | Mention the difference between Skew rays and meridional rays. | | CO1 | 1 | |
| 8. | | State Snell’s law. | | CO1 | 1 | |
| 9. | | When the angle of incidence is equal to the critical angle, what will happen to a ray of light passing from denser medium to rarer medium? | | CO1 | 1 | |
| 10. | | What are the applications of LED? | | CO1 | 1 | |
| **PART B(5 X 3= 15 MARKS)** | | | | | | |
| 11. | Differentiate buncher and catcher cavities | | CO2 | | | 3 |
| 12. | What are the methods of waveguide excitations | | CO2 | | | 3 |
| 13. | Explain the energy band diagram of GUNN diode? | | CO3 | | | 3 |
| 14. | 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? | | CO1 | | | 3 |
| 15. | What are the causes for dispersion in optical fiber? | | CO1 | | | 3 |

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| **PART C(5 X 15= 75 MARKS)** | | | | |
| 16. |  | Derive an expression for S matrix in 4 port Directional Coupler. | CO3 | 15 |
| (OR) | | | | |
| 17. |  | Construct 4 port circulator through phase shifters, couplers and explain its operation. | CO3 | 15 |
| 18. |  | Explain the principle of operation of two –cavity klystron with neat diagram. | CO2 | 15 |
| (OR) | | | | |
| 19. | a. | Explain the working of reflex klystron with neat diagram. | CO2 | 8 |
| b. | With neat circuit diagram, elucidate the M type microwave vacuum tube which is used in microwave oven. | CO2 | 7 |
| 20. |  | Compare IMPATT and TRAPATT diodes with neat diagrams | CO3 | 15 |
| (OR) | | | | |
| 21. | a. | What are the modes of operation of GUNN diode? | CO3 | 6 |
| b. | How will you measure the frequency of microwave through slotted line method? | CO3 | 9 |
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| 22. | a. | Discuss about types of dispersion that affect fiber optic communication. | CO1 | 10 |
| b. | What are the advantages of optical communication over electrical communication? | CO1 | 5 |
| (OR) | | | | |
| 23. | a. | What is numerical aperture? Derive the expression for numerical aperture with a neat diagram. | CO1 | 12 |
| b. | Calculate the numerical aperture and acceptance angle for an optical fiber of which the refractive index of core is 1.5 and refractive index of cladding is 1.48. | CO1 | 3 |
| 24. | a. | Differentiate spontaneous and stimulated emission. | CO1 | 6 |
| b. | Explain the operation of semiconductor injection LASER diode. | CO1 | 9 |
| (OR) | | | | |
| 25. |  | Explain the construction and operation of Avalanche photodiode in detail. | CO1 | 15 |

ALL THE BEST