| Course Type | Course Code | Name of Course | L | T | P | Credit |
|---|---|---|---|---|---|---|
| DE | NECD504 | Microwave Photonics | 3 | 0 | 0 | 3 |

| Course Objective |
|---|
| The objective of the course is to provide microwave and optical technologies to overcome the limitation of microwave technology |
| **Learning Outcomes** |
| At the end of the course, the student must be able to<br>• Explore the close interactions of lightwave and microwave and understand the physical principles of the hybrid field.<br>• Learn and investigate the microwave photonics principles through a number of cutting-edge system applications ranging from high-speed fibre-wireless links to microwave photonic signal processing. |

| Module No. | Topics to be Covered | Lecture Hours | Learning Outcome |
|---|---|---|---|
| 1 | Introduction to Microwave Photonics: An introductory overview, Advantages of Microwave photonics over conventional Microwave techniques. Photonic devices and its application at high frequency, Limitation of direct modulation at high frequency, Microwave photonic detectors | 12 | Acquire an understanding of microwave Photonics |
| 2 | Microwave photonic components: High speed Modulator. Electro-optic modulators: Biasing and transfer characteristic of Mach-Zehnder Modulator (MZM), Electro-absorption modulators, Fiber Bragg Grating filter, Semiconductor optical amplifier. | 12 | Understand about High speed Modulator. Electro-optic modulators, Biasing and transfer characteristic of Mach-Zehnder Modulator (MZM. |
| 3 | Microwave photonic systems: Introduction to Radio over fiber, Photonic microwave signal generation and processing, Optoelectronic microwave oscillator, Microwave photonic mixer, Microwave photonic filter, Terahertz signal generation and detection. | 12 | Understand the working principle of radio over fiber, Photonic microwave signal generation and processing, filter. |
| 4 | Microwave photonics in instrumentation and measurement: Photonic approach of microwave frequency measurement. | 06 | Acquire an understanding of photonic approach of microwave frequency measurement. |
| | **Total** | **42** | |

**Textbook:**


1. Microwave Photonics: Devices and Applications by Stavros Iezekiel John Wiley & Sons, Ltd 2009.


**Reference Books:**


1. Optoelectronics and Photonics, O S Kasap (Pearson publication) Semiconductor Optical Amplifiers, 2013
2. Semiconductor optical amplifiers, second edition by N.K Dutta , Q. Wang January 2013