Course Outcomes of MOC

Sr. No.	Course Code & Title	Course Outcomes	
1	**Antenna Design and Analysis (MOC501)**	MOC501.1	Classify different type of antennas based on its designs and applications
		MOC501.2	Apply analytical or empirical formulas for theoretical analysis to design and develop a micro-strip antenna
		MOC501.3	Implement the concept of antenna array and realize it to design different types of arrays.
		MOC501.4	Understand concept of smart antenna to achieve beam forming
		MOC501.5	Measure antenna parameters to analyze designed antenna's performance.
2	**OPTICAL COMMUNICATION SYSTEMS (MOC503)**	MOC503.1	Describe the components of optical communication system, i.e., fibers, optical sources and detectors
		MOC503.2	Differentiate and compare different optical signalling schemes and optical line coding schemes in optical communications
		MOC503.3	Explain the working of a homodyne and heterodyne receiver
		MOC503.4	Analyze the performance of optical receivers for various modulation and demodulation schemes
		MOC503.5	Design an optical communication system by calculating the power and time budget
3	**SEMICONDUCTOR OPTOELECTRONICS (MOC505)**	MOC505.1	Explain the fundamentals of semiconductor device physics such as the E-k diagram and working of the p-n junction
		MOC505.2	Differentiate between the optical interband transitions in semiconductors
		MOC505.3	Illustrate the working principles of optical sources (LEDs and LASERS),
		MOC505.4	Analyze the performance of various types of photo-detectors based on their device characteristics and efficiency
		MOC505.5	Evaluate the performance of different types of optical modulators and optical amplifiers
4	**RF AND MICROWAVE CIRCUITS (MOC507)**	MOC507.1	Explain working principle of different planar components by using network analysis.
		MOC507.2	Construct the circuit in simulator and then fabricate it by using photolithography technique
		MOC507.3	Analyze the design equations to develop circuit model in simulator to perform comparative analysis.
		MOC507.4	Design, develop, optimize, fabricate and test different micro-strip components.
		MOC507.5	Compare the performance of the micro-strip component in both simulations in measurements

5	**Photonic Switches & Networking (MOC511)**	MOC511.1	Describe the various optical multiplexing techniques used in photonic networks
		MOC511.2	Compare and contrast the various topologies of single and multi-hop networks
		MOC511.3	Illustrate the working principles of devices used in photonic networks
		MOC511.4	Differentiate between the various optical networks such as SONET and DQDB based on their technical differences
		MOC511.5	Analyze the performance of different photonic switches
6	**Nanophotonic Devices for Communication (MOC513)**	MOC513.1	Explain the fundamentals of light-mater interactions and the electromagnetic response of media at different frequencies
		MOC513.2	Identify the advantages and limitations of tailoring the optical and electromagnetic properties of nanophotonic materials and devices
		MOC513.3	Apply the knowledge of fundamentals of nanophotonics to design sensors and other nanophotonic devices
		MOC513.4	Illustrate the fundamentals of metamaterials and metasurfaces and their applications
		MOC513.5	Describe the nanofabrication processes employed to fabricate nanophotonic devices
7	**Technology for RADAR Systems (MOC515)**	MOC515.1	Explore the fundamental concepts of radar systems, including radar parameters, detection theory, and types of radars.
		MOC515.2	Analyze radar signal processing techniques, including waveform design, matched filtering, and clutter modeling.
		MOC515.3	Evaluate radar measurement techniques and interpret range, velocity, and ambiguity diagrams
		MOC515.4	Demonstrate knowledge of radar tracking techniques and imaging systems such as mono- pulse, conical scan, and Doppler radars.
		MOC515.5	Apply modern and emerging technologies, including optical techniques, to enhance radar system functionality.
8	**SEMICONDUCTOR MICROWAVE DEVICES (MOC517)**	MOC517.1	Understand the fundamental concepts of semiconductor physics and the formation mechanism of p-n junction and Schottky contact
		MOC517.2	Introduce various types of semiconductor-based diodes useful in microwave engineering
		MOC517.3	Analyze and design various semiconductor microwave devices such as BJT, FETs and HEMTs
		MOC517.4	Analyze and apply small-signal and large-signal models of Bipolar Junction Transistors (BJTs) and Field-Effect Transistors (FETs) for RF circuits
		MOC517.5	Analyze the S-parameters for microwave semiconductor devices

9	**English for Research Paper Writing (UEC501)**	UEC501.1	Understand the structure and components of a research paper, including title, abstract, introduction, methodology, results, and conclusion
		UEC501.2	Develop clarity, precision, and coherence in academic writing using appropriate vocabulary, grammar, and formal tone.
		UEC501.3	Apply proper citation styles, referencing methods, and avoid plagiarism through ethical research writing practices.
		UEC501.4	Critically review and revise drafts to improve content flow, argument strength, and language accuracy.
		UEC501.5	Prepare and present publication-ready research papers and confidently respond to peer review and editorial feedback
10	**OPTICAL ELECTRONICS (MOC502)**	MOC502.1	Apply modal analysis to illustrate the working of an optical fiber waveguide
		MOC502.2	Illustrate the working principles of optical resonators
		MOC502.3	Design phase and amplitude modulators based on electro-optic modulation of laser beams
		MOC502.4	Describe acousto-optic modulation based on Raman Nath and Bragg diffraction
		MOC502.5	Discuss the principles of non-linearity in optical fibers and their application to self-phase modulation
11	**Microwave Active Circuits (MOC504)**	MOC504.1	Explain working
		MOC504.2	Construct the circuit in 3-D simulator and then optimize its performance for different applications
		MOC504.3	Analyze the design equations to develop circuit model in
		MOC504.4	Design, develop, optimize, fabricate and test different RF active components.
		MOC504.5	Distinguish different type of RF and microwave active devices based upon its circuit model.
12	**Biomedical Photonics (MOC520)**	MOC520.1	Describe the fundamentals of light matter interaction, and sensing
		MOC520.2	Discuss the fiber optic sensors based on different sensing modalities
		MOC520.3	Illustrate the working principles of Plasmonic, FBG and LPG based sensors
		MOC520.4	Differentiate and compare the various techniques of biomedical spectroscopy
		MOC520.5	Illustrate the various imaging and image reconstruction approaches

13	**Solar Photovoltaics (MOC522)**	MOC522.1	Describe the fundamentals of the sun-earth interaction and the need of solar photovoltaics
		MOC522.2	Illustrate the working principles of a solar cell and solar PV modules
		MOC522.3	Design solar cells and calculate the photovoltaic efficiency of a solar cell
		MOC522.4	Compare and contrast the various solar cell technologies on the basis of their efficiency, ease of fabrication and other important parameters
		MOC522.5	Describe and compare various emerging solar cell technologies
14	**Antenna Arrays and Beamforming (MOC524)**	MOC524.1	Demonstrate a solid understanding of the fundamental principles of antenna arrays, including array factor, radiation pattern, beamforming, and sidelobe suppression.
		MOC524.2	Explore various optimization techniques used for antenna array design and performance
		MOC524.3	enhancement, including gradient-based methods, metaheuristic algorithms, and numerical optimization approaches
		MOC524.4	Develop the ability to apply optimization methods to antenna array problems, including optimizing beam patterns, steering angles, and array geometries to meet specific
		MOC524.5	performance requirements
15	**Milli-meter Wave Technology (MOC530)**	MOC530.1	Explore the fundamentals of millimeter waves, frequency bands, propagation, guiding structures, and their practical applications
		MOC530.2	Analyze the design and function of mmWave components such as couplers, tee junctions, waveguide transitions, and filters.
		MOC530.3	Demonstrate knowledge of various mmWave antenna types including planar, horn, lens, and biomedical antennas.
		MOC530.4	Design and evaluate mmWave systems, including frequency multipliers, transceivers, and calibration systems.
		MOC530.5	Apply mmWave technologies in real-world communication systems and conduct basic system-level performance evaluations.
16	**Smart Antennas (MOC532)**	MOC532.1	Explore the architecture, types, benefits, and limitations of smart antennas and their applications in modern communication systems.
		MOC532.2	Analyze and compare various smart antenna configurations including beamforming, diversity techniques, and adaptive arrays.
		MOC532.3	Apply mathematical and signal processing techniques for Angle-of-Arrival (AOA) estimation using multiple estimation methods.
		MOC532.4	Evaluate the principles and performance of MIMO antenna systems, including SISO, SIMO, MISO, and massive MIMO configurations.
		MOC532.5	Demonstrate knowledge of 5G technologies, including architecture, radio access networks, spectrum usage, and system design considerations.

17	**Biomedical Antennas (MOC534)**	MOC534.1	Investigate the requirements, standards, and challenges associated with implantable antennas.
		MOC534.2	Understand computational methods such as Green's Function Methodology and Finite
		MOC534.3	Difference Time Domain (FDTD) Methodology for analyzing implantable antennas.
		MOC534.4	Investigate the effects of conductors on small wire antennas inside biological tissue.
		MOC534.5	Explore the behaviour of antennas inside human body using various models
18	**Free Space Optical Communications (MOC536)**	MOC536.1	Describe the working of an optical wireless communication system
		MOC536.2	Apply indoor and outdoor channel models to evaluate an OWC system
		MOC536.3	Compare and contrast the different models of turbulence induced fading
		MOC536.4	Differentiate between the various modulation schemes for optical wireless communication based on their power and bandwidth efficiency
		MOC536.5	Design an optical wireless communication system such as a vehicle-to-vehicle OWC system
19	**Research Methodology and IPR (UCC502)**	UCC502.1	To understand the fundamental principles of research and different types of research methodologies.
		UCC502.2	To comprehend the concept of literature review, technical reading, and the importance of citations and attributions in research.
		UCC502.3	To understand the concepts of Intellectual Property Rights (IPR) in engineering and their significance.
		UCC502.4	To understand the importance of IPR protection and be able to identify potential patentable inventions.
		UCC502.5	To be able to contribute to research projects and collaborate with others.
20	**Microwave Measurement Techniques (MOC601)**	MOC601.1	Explain the fundamentals of RF, microwave, and millimeter-wave power measurement and frequency determination.
		MOC601.2	Describe the working and applications of Vector Network Analyzers (VNA) and Scalar Network Analyzers (SNA)
		MOC601.3	Analyze the role and usage of Spectrum Analyzers for SatCom antenna evaluation.
		MOC601.4	Understand and apply noise measurement techniques in RF/microwave systems
		MOC601.5	Evaluate antenna measurement parameters and microwave signal generation techniques (DDS, PLL).
	Optical Signal	OEC601.1	Implement the Fresnel transform, the Fourier transform, and the extended Fourier transform
		OEC601.2	Discuss the application of spatial light modulation in signal processing
		OEC601.3	Elaborate the process of spatial filtering

21	**Processing (OEC 601)**	OEC601.4	Compare and contrast the techniques employed for generating spatial filters
		OEC601.5	Design a preliminary optical signal processor