# 23EC2203-ANALOG AND DIGITAL COMMUNICATIONS

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| **CourseCategory:** | ProgramCore | **Credits:** | 3 |
| **CourseType:** | Theory | **Lecture-Tutorial-Practical:** | 3-0-0 |
| **Prerequisite:** | Signals&Systems | **SessionalEvaluation:ExternalEvaluation:****TotalMarks:** | 3070100 |
| **CourseObjectives** | Students under going this course are expected o: |
| 1. Introducevariousmodulationanddemodulationtechniquesofanaloganddigitalcommunicationsystems.
2. Analyzedifferentparametersofanaloganddigitalcommunicationtechniques.
3. Understandfunction ofvariousstagesofAM,FMtransmittersandKnowcharacteristicsof AM &FM receivers.
4. Analyzetheperformanceofvariousdigitalmodulation techniquesinthepresence ofAWGN.
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| **CourseOutcomes** | Attheendof thiscourse,thestudentwillbeableto: |
| CO1 | Recognizethebasicterminologyusedinanalogand digitalcommunicationtechniquesfor transmissionofinformation/data.(L1) |
| CO2 | Explainthebasicoperationofdifferentanaloganddigitalcommunicationsystemsatbasebandandpassbandlevels.(L2) |
| CO3 | Computevariousparametersofbasebandand passbandtransmissionschemesbyapplying basicengineering knowledge.(L3) |
| CO4 | Analyzetheperformanceofdifferentmodulation&demodulationtechniquestosolve complexproblemsinthepresence ofnoise.(L4) |
| CO5 | Evaluate the performance of all analog and digital modulation techniques toknowthe meritsand demeritsofeachoneofthemin termsofbandwidthandpowerefficiency.(L5) |
| **CourseContent** | **UNITI****Amplitude Modulation:**Need for modulation, Amplitude Modulation-Time andf requency domain description, single tone modulation, power relations in AM waves, Generation of AM waves - Switching modulator, Detection of AM Waves – Envelope detector, DSBSC modulation - time and frequency domain description, Generation of DSBSC Waves-Balanced Modulators, Coherent detection of DSB-SC Modulated waves ,COSTAS Loop ,SSB modulation-time and frequency domain description, frequency discrimination and Phase discrimination methods for generating SSB, Demodulation of SSB Waves, principle of Vestigial side band modulation.**UNITII****Angle Modulation:** Basic concepts of Phase Modulation, Frequency Modulation: Single tone frequency modulation, Spectrum Analysis of Sinusoidal FM Wave using Bessel functions, Narrow band FM, Wide band FM, Constant Average Power, Transmission bandwidth of FM Wave -Generation of FM Signal- Armstrong Method, Detection of FM Signal: Balanced slope detector, Phase locked loop, Comparison of FM and AM., Concept of Pre-emphasis and de-emphasis**UNITIII****Transmitters:** Classification of Transmitters, AM Transmitters, FM Transmitters Receivers :Radio Receiver –Receiver Types-Tuned radio frequency receiver ,Super heterodyne receiver, RF section and Characteristics-Frequency changing and tracking, Intermediate frequency, Image frequency ,AGC ,Amplitude limiting, FM |

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| **CourseContent** | Receiver, Comparison of AM and FM Receivers.**UNITIV****Introduction to Noise:** Types of Noise, Receiver Model, Noise in AM, DSB, SSB, and FM Receivers.**Pulse Modulation:** Types of Pulse modulation- PAM, PWM and PPM. Comparison of FDM and TDM. Pulse Code Modulation :PCM Generation and Reconstruction ,Quantization Noise, Non-Uniform Quantization and Companding, Delta Modulation ,DPCM, Noise in PCM and DM.**UNITV****Digital Modulation Techniques:** Coherent Digital Modulation Schemes–ASK ,BPSK ,BFSK ,QPSK ,Non-coherent BFSK, DPSK .M-ary Modulation Techniques ,Power Spectra, Bandwidth Efficiency.**Base band Transmission and Optimal Reception of Digital Signal:** A Base band Signal Receiver, Probability of Error, Optimum Receiver, Coherent Reception, ISI, Eye Diagrams. |
| **Text BooksandReferenceBooks** | **Textbooks:**1. SimonHaykin,“CommunicationSystems”,JohnWiley&Sons,4thEdition,2004.
2. WayneTomasi-ElectronicsCommunicationSystems-FundamentalsthroughAdvanced,5thEd.,PHI,2009
3. B.P.Lathi,ZhiDing“ModernDigitalandAnalogCommunicationSystems”,Oxfordpress,2011.

**References:**1. SamShanmugam,“DigitalandAnalogCommunicationSystems”,JohnWiley&Sons, 1999.
2. BernardSklar,F.J.Harris“DigitalCommunications:FundamentalsandApplications”, PearsonPublications,2020.
3. TaubandSchilling,“PrinciplesofCommunicationSystems”,TataMcGrawHill,2007.
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| Contribution of Course Outcomes towards achievement of Program Outcomes (3-High, 2-Medium, 1-Low) |
|  | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
| CO1 | 3 | 2 | 2 | - | - | - | - | - | - | - | - | - | 3 | 3 |
| CO2 | 3 | 2 | 2 | - | - | - | - | - | - | - | - | - | 3 | 3 |
| CO3 | 3 | 3 | 3 | - | - | - | - | - | - | - | - | - | 3 | 3 |
| CO4 | 3 | 3 | 2 | 3 | - | - | - | - | - | - | - | - | 3 | 3 |
| CO5 | 3 | 3 | 2 | - | - | - | - | - | - | - | - | - | 3 | 3 |