NOTIFICATION

No. 112/2023 Date : 14/08/2023

Subject: Revised Syllabi of Semester IV, V & VIII of B.E. (Electronics & Telecommunication Engineering) (CBCS) as per AICTE Model Curriculum.

It is notified for general information of all concerned that the authorities of the University have accepted to implement revised Syllabi of Semester IV, V & VIII of B.E. (Electronics & Telecommunication Engineering) (CBCS) as per AICTE Model Curriculum to be implemented from the academic session 2023-2024 onwards as given below:

Sd/-
(Dr.T.R.Deshmukh)
Registrar
Sant Gadge Baba Amravati University

REVISED SYLLABI PRESCRIBED FOR SEMESTER IV, V & VIII OF B.E. (ELECTRONICS & TELECOMMUNICATION ENGINEERING)

SEMESTER: IV 4ETC01 - ANALOG AND DIGITAL COMMUNICATION

Course Objectives:

1. To understand different modulation and demodulation techniques in analog and Digital communication.
2. To interpret the performance of analog communications systems in presence of noise
3. To study various pulse modulation and demodulation techniques used in transmission of analog signal.
4. To understand the concept of sampling and quantization in digital transmission system.
5. To study multiplexing system.
6. To study basic building blocks of digital communication system.
7. To learn information theory and theoretical bounds on the data rates of digital communication.
8. To study and analyze different digital modulation techniques.
9. To study baseband transmission of the signal.

Course Outcomes:

Upon successful completion of this course, the student will be able to:

1. Understand the necessity of modulation and identify the various components of analog and Digital communication systems.
2. Understand different modulation and demodulation schemes in analog communication systems.
3. Compare and contrast the strengths and weaknesses of various communication systems.
4. Apply the concepts of Probability theory in communication systems.
5. Analyze the performance of various pulse modulation schemes.
6. Understand basic building blocks of digital communication system and formatting of digital signal.
7. Understand concepts of information theory and analyze information transmission over communication channel.
8. Analyze performance of different digital modulation techniques.

Unit I: AM Transmitters and Receivers:

Modulation, need of modulation, AM Modulation (Mathematical expression and related numericals), Principles of DSB-FC, DSBSC, SSB-SC modulation and their comparison, Details of DSB-FC Transmitter.(no method of SSB-SC,DSB-SC Generation) Super heterodyne receiver: Detail block diagram, Need and types of AGC, Receiver Characteristics: Selectivity, Sensitivity & Fidelity. (6 Hours)

Unit II: FM Transmitters and Receivers:

FM Modulation, Circuit & Analysis for direct FM generation using FET. Circuit & analysis of Indirect FM generation, Narrow Band and Wide Band FM, their comparison, Preemphasis and Deemphasis.FM Receiver block diagram including Limiter.

FM Discriminator: Introduction to Single Slope and Balanced slope detector, Foster Seeley and Ratio detectors. Comparison of performance of AM & FM systems. (6 Hours)

Unit III: Random Processes and Noise:

Introduction, Random vectors obtained from random processes, Stationary, Mean, Correlation & Covariance function, Properties of autocorrelation function, Properties of power spectral density. Types of Noise, Gaussian and white noise characteristics. (6 Hours)

Unit IV: Pulse Modulation:

Band limited & time limited signals, Narrowband signals and systems, Sampling Theorem in time domain, Nyquist criteria, ISI, Types of sampling- ideal, natural, flat top, Aliasing & Aperture effect.

Analog modulation techniques: PAM, PWM & PPM. Digital representation of Analog signal, PCM Generation and Reconstruction: Quantization (basic working), Delta Modulation, Adaptive Delta Modulation. (6 Hours)

Unit V: Introduction to Digital Communication System:
Functional Blocks of Digital Communication System, Line Coding: Need for Line coding, Properties of Line Coding, Types of Line Coding and its comparison, Scrambler and Unscrambler.
Information Theory: Measure of Information, Entropy and Information Rate Introduction of Binary Symmetric Channel. (6 Hours)

6 Digital Modulation: BPSK, BFSK, ASK and DPSK generation and reception, QPSK and MSK Transmitter and Receiver, Comparison of Digital modulation systems (should include Probability of error parameter)
Equalization: Need and types of equalization, Clock and Carrier Synchronization.

Text Books:

1. Kennedy G. “Electronic Communication System” Tata Mc-Graw Hill Co., New Delhi (Third Ed).
2. Taub and Schilling D.L., “Principles of Communication Systems”, Mc-Graw Hill Co., New Delhi (Second Ed.).
3. Shanmugam K.S., “Digital & Analog Communication Systems”, John Wiley & Sons, NewYork, 1996.
4. Lathi B. P., “Modern Digital and Communication Systems”, Holt Rinchart and Winston Inc.,New York, 1993.
5. Simon Haykin, “Digital Communication”, John Wiley and Sons,Pvt. Ltd., Singapore.

References:

1. Proakis J. K., “Digital Communication”, Mc-Graw Hill Book Co., London (2nd Edition).
2. Glover and Grant, “Digital Communication”, Prentice Hall Publication.
3. Collins Dennis, Collins John, “Electronic Communications” PHI.
4. Wayne Tomasi, “Electronic Communication Systems”, Pearson Education, (Fifth Edition).
5. Wozencraft J. M. and Jacobs I. M., ``Principles of Communication Engineering", John Wiley, 1965.
6. Barry J. R., Lee E. A. and Messerschmitt D. G., ``Digital Communication", Kluwer Academic Publishers, 2004.

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5ETC04 Prof. Elective –I (ii) FIBER OPTICS COMMUNICATION

Course Objectives:

1. To understand the basic elements of optical fiber transmission link, fiber modes configurations and structures.
2. To impart the knowledge of different kind of losses, signal distortion and dispersion in optical fiber.
3. To elaborate the various aspects of optical sources.
4. To discuss principles of fiber optical receivers and detectors.
5. To understand the concept ofoptical fiber couplers and switches.
6. To introduce to WDM and DWDM systems and effects on fiber link.

Course Outcomes:

Upon successful completion of this course, the student will be able to:

1. Illustrate the principles fiber-optic communication, the components and Losses and dispersion in fiber.
2. Explain the transmission characteristics of optical fiber
3. Express the properties of the optical components in sources.
4. Explain operation of lasers, LEDs, and detectors in fiber
5. Describethe aspects of optical fiber coupler and switches
6. Elaborate WDM and DWDM systems.

SYLLABUS

Unit I: Optical Fiber Communication System:
Basic optical laws and definitions, Optical fiber modes and configurations, N.A.Step index fibers, Graded index fibers, Single mode fibers, Cutoff wavelength, Block Diagram of fiber optic communication [Numerical based on N.A.].
(6 Hours)

Unit-II: Types of fiber and Dispersion:
Attenuation: Units, absorption, scattering losses radioactive losses, core and cladding losses, Material dispersion, wave guide dispersion, intermodal dispersion. [Numerical based on mode calculations] **(6 Hours)**

Unit-III: Optical Sources:
Light Emitting Diodes: Structure, Light source materials. Laser Diodes: Structure, threshold conditions, Modulations of laser diodes.(Numerical based on efficiency) **(6 Hours)**

Unit-IV: Optical Detectors: Principles of photodiodes, Photo detector noise, Detector response time, Avalanche multiplication noise, Temperature effect on avalanche gain. (Numerical based on response time, avalanche gain)

(6 Hours)

Unit-V: Optical switches:
Introduction to Fiber Couplers: Three & four port coupler, Star coupler, electro-optic-switches. Optical amplifiers - EDFA, Raman amplifier **(6 Hours)**

Unit-VI: WDM and DWDM systems:
Need of WDM, Principles of WDM networks, Nonlinear effects in fiber optic links, Concept of self-phase modulation, Introduction to DWDM . **(6 Hours)**

Text Book: G. Keiser, "*Optical Fibre Communication*", McGraw Hill International.

Reference Book: Seniors J. M., "*Optical Fibre Communication and Applications*", Prentice Hall of India Pvt. Ltd., New Delhi.

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8ETC04 Prof. Elective –VI (i) 5G-6G MOBILE COMMUNICATION

Course Pre-requisites: 7ET04: Mobile Communication and Networks

Course Objectives:

1. To understand latest trends in wireless technologies, a path towards 5G and 6G system.
2. To study network architecture, components, features and benefits of 5G system.
3. To understand various radio waveforms and channel model for 5G.
4. To understand different networking techniques in 5G system.
5. To study introduction of 6G system.

Course Outcomes:
Upon successful completion of this course, the student will be able to:

1. Illustrate the evolution of mobile communication leading to the introduction of 5G.
2. Explain the mm wave 5G and overview of MIMO.
3. Elaborate the Channel access methods of 5G.
4. Discuss key issues and challenges in 5G deployment.
5. Understand the applications of 5G.
6. Understand the concept of 6G.

Unit-I:
Introduction To 5G: Historical trend and evolution of LTE technology to beyond 4G – Key building blocks of 5G, Specification requirements for driving 5G technology , 5G Use Cases and System Concepts – The 5G Architecture – IoT in relation to 5G. **(6 Hours)**

Unit-II:
Rf Front End For 5G: Millimeter Wave Communications: Hardware technologies for mmW systems – Characteristics, Use cases, Advantages. Massive MIMO: Fundamentals, Advantages MIMO – Beamforming Overview.
(6 Hours)

Unit-III:
5G Waveforms And Channel Models: 5G Radio Access Technologies: Radio Access for V2X Communication - Radio access for massive machine-type communication – RAN introduction and types. 5G channel access methods.
(6 Hours)

Unit-IV:
Networking In 5G: Coordinated multi-point transmission in 5G: Joint Transmission CoMP enablers - Distributed cooperative transmission - Relaying techniques, Multi-flow wireless backhauling. **(6 Hours)**

Unit-V:
Applications of 5G: Machine-type communications: Fundamental techniques for MTC - Massive MTC - Ultra-reliable low-latency MTC - Device-to-device (D2D) communications- Multi-operator D2D communication. (6 Hrs.)

Unit-VI: Introduction To 6G:
Key building blocks of 6G – 6G use cases and System Concepts – The 6G Architecture . **(6 Hours)**

Text Books:

1. Wei Xiang, Kan Zheng, Xuemin (Sherman) Shen, - 5G Mobile Communications, Springer, 2017.
2. Afif Osseiran, Jose F. Monserrat and Patrick Marsch, - 5G Mobile and Wireless Communications Technology, Cambridge University Press, 2016.

Reference Book: Jonathan Rodriguez, - Fundamentals of 5G mobile networks, John Wiley & Sons, Ltd, 2015.

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