

GUJARAT TECHNOLOGICAL UNIVERSITY

B. E. SEMESTER: VI

Instrumentation and Control Engineering

Subject Name: **Analog and Digital Communication**

Subject Code: **161704**

Teaching Scheme				Evaluation Scheme		
Theory	Tutorial	Practical	Total	University Exam (Theory) (E)	Mid Sem Exam (Theory) (M)	Practical (I)
3	0	2	5	70	30	50

Part – I Basic Communication Theory:

Sr. No	Course Content	Total Hrs.
1.	Introduction to communication systems: <ul style="list-style-type: none">• Communication, communication systems,• Modulation, bandwidth requirement	2
2.	Noise: <ul style="list-style-type: none">• External noise, internal noise,• Noise calculations, noise figure, noise temperature	2
3.	Amplitude Modulation: Amplitude modulation theory – Frequency spectrum of AM wave, representation of AM wave, Power relation in the AM wave	3
4.	Frequency and Phase Modulation: Theory of Frequency and Phase Modulation: Description of the systems, mathematical representation of FM, Frequency spectrum of FM wave, Phase modulation, Intersystem comparison, Noise and FM: Effect of noise on carrier, pre-emphasis and de-emphasis, other form of interference, comparison of wide band and narrow band FM	4
5.	Modulation for Digital Signal: ASK, FSK, and PSK: Introduction, modulation and demodulation circuits, and waveforms Pulse Modulation: Types, PWM	3

Part – II Data and Network Communication:

Sr. No	Course Content	Total Hrs.
1.	Introduction To Data And Network Communication: <ul style="list-style-type: none">• Introduction, Data Communication System, Data Communication Links,• Character Codes, Digital Data Rates, Serial Data Formats Encoded Data Formats.	3
2.	Error Detection & Correction: <ul style="list-style-type: none">• Introduction, Asynchronous Data Method, Synchronous Data• Error Methods, Error Testing Equipment.	2
3.	Open System Network Models: <ul style="list-style-type: none">• Introduction, Data Topologies, Data Switching,• Types Of Networks, The Open System Interconnection (OSI) Architecture,• System Network Architecture (SNA), SNA Operating Sessions.	3
4.	OSI Physical Layer Components: <ul style="list-style-type: none">• Introduction, Units Of a Communication Link,• RS232C Interface Standard, RS449 interface standards,• RS422 And RS423 Interface Standards,• FSK Modems, Additional Types Of Modems, V.34 And V.90 Modems.	5
5.	Higher Capacity Data Communication: <ul style="list-style-type: none">• Introduction, Multiplexing Methods, Sampling Theorem, Quantization,• Pulse Code Modulation, Delta Modulation,• Digital T Carriers, Companding, Codecs.	3
6.	Data-Link Layer Protocols: <ul style="list-style-type: none">• Introduction, Data-Link Section, Character-Oriented Protocols,• Bit-Oriented Protocols, Protocol Analyzers.	2

7.	Network Architecture And Protocols: <ul style="list-style-type: none"> • Introduction, Network By Size, IEEE 802.3 And Ethernet, IEEE 802.4 Token Bus, IEEE802.5 Token Ring, • Network Interface Cards , Interconnecting LANs , IEEE 802.6 Metropolitan Area Network (MAN), X.25 Packet Switch Protocol. 	3
8.	Fiber Optic Communication: <ul style="list-style-type: none"> • Introduction, Basic Concepts of Light Propagation, • Fiber Cables, Light Sources, Optical Detectors, • Fiber-Cable Losses, Wave Division Multiplexing, Fiber Distributed Data Interface, FDD-II: Isochronous Traffic, The Fiber Channel, • SONET. 	3
9.	Wireless Communication Systems: <ul style="list-style-type: none"> • Introduction, Microwave Communications, Cellular Mobile Telephone Service, Personal Communication System, • IEEE802.11: Wireless LANs Using CSMA/CA, Cellular Digital Packet Network, Satellite Communication, Satellite Networking. 	4

Text Books:

1. Electronic Communication Systems by Keddedy and Davis, Tata Mc-Graw Hill Publication
2. Introduction to Data and Network Communications by Michael A. Miller, Pub: Cengage Learning

Reference Books:

1. Communication Systems: Analog and Digital by R. P. Singh and B. D. Sapre, Pub: Tata-McGraw Hill
2. Modern Digital and Analog Communication Systems (4th Edition) by B. P. Lathi and Zhi Ding, Pub: Oxford University Press