

**EE-217 F**

**Digital and Analog Communication  
(CSE, IT)**

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Class Work: 50  
Exam: 100  
Total: 150

Duration of Exam: 3 Hrs.

**NOTE: For setting up the question paper, question no 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.**

**Section A: Communication system components:**

Introduction to Communication: Definition & means of communications; Digital and analog signals: sign waves, square waves; Properties of signals: amplitude, frequency, phase; Theoretical basis for data communication: Fourier analysis: Fourier series and Fourier Transform (property, ESD, PSD and Raleigh) effect of limited bandwidth on digital signal.

**Section B: Data Transmission System:**

Physical connections: modulation, amplitude-, frequency-, phase- modulation; Data encoding: binary encoding (NRZ), Manchester encoding, differential Manchester encoding.

Transmission Media: Twisted pair-, co-axial-, fiber optic-cables, wireless media Transmission impairments: attenuation, limited bandwidth of the channels, delay distortion, noise, data rate of the channels (Nyquist theorem, Shannon limit).

Physical layer interfaces: RS 232, X.21

**Section C: Standards in data communications:**

Communication modes: simplex, half duplex, full duplex; Transmission modes: serial-, parallel-transmission; Synchronizations: Asynchronous-, synchronous-transmission; Type of services: connection oriented-, connectionless-services; Flow control: unrestricted simplex protocol, simplex stop- and -wait protocol, sliding window protocol; Switching systems: circuit switching; picketing switching: data gram , virtual circuits, permanent virtual circuits.

Telephone Systems: PSTN, ISDN, asynchronous digital subscriber line.

Multiplexing: frequency division-, time-, wave- division multiplexing

**Section D: Security in data communications:**

Transmission errors: feedback-, forward-error control approaches; Error detection; Parity check, block sum check, frame check sequences; Error correction: hamming codes, cyclic redundancy check; Data encryption: secret key cryptography, public key cryptography; Data compression: run length encoding, Huffman encoding.

**Text Book:**

- Data Communications, Computer Networks and Open Systems Halsall Fred, (4<sup>th</sup> editon) 2000, Addison Wesley, Low Price edition

**Reference Books:**

- Business Data Communications, Fitzgerald Jerry, 7<sup>th</sup> Ed. New York, 2001, JW&S,
- Communication Systems, 4<sup>th</sup> Edi, by A. Bruce Carlson, Paul B. Crilly, Janet C. Rutledge, 2002, TMH.
- Data Communications, Computer Networks and Open Systems, Halsall Fred, 1996, AW.
- Digital Communications, J.G. Proakiss, 4<sup>th</sup> Ed., MGH
- Satellite Communication, Pratt, John Wiley
- Data & Computer Communications, W.Stallings PHI
- Digital & Data Communication systems, Roden 1992, PHI,
- Introduction to Digital & Data Communications, Miller Jaico Pub.
- Data Communications and Networking, Behrouz A. Forouzan, 2003, 2<sup>nd</sup> Edition, T.M.H