

TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2083 Baishakh

Exam.	Back (New Course)		
Level	BE	Full Marks	60
Programme	BCT	Pass Marks	24
Year / Part	II / II	Time	3 hrs.

Subject: - Data Communication (ENCT 253)

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ Attempt All questions.
- ✓ The figures in the margin indicate Full Marks.
- ✓ Assume suitable data if necessary.

1. a) Define any six performance/impairment parameters common in digital data communication. [3]
 b) Using a suitable generic real-world example of a digital communication system, explain its functioning in full-duplex mode. [4]
2. a) With suitable examples, explain how linearity of a system is checked. [5]
 b) Mention the conditions and properties of Fourier transformation. [4]
3. a) Compare coaxial cable, twisted pair, and optical fiber based on bandwidth, cost, and use case. [2]
 b) Encode “Solve $\{(a+b)(a-b)\}^2$.” using Shannon-Fano Encoder, and find the transmission efficiency. [5+2]
 c) Using any example of a 3x3 generation matrix, demonstrate how LBC corrects a single bit error. [5]
4. a) Draw the waveform for the bit sequence 1000000101 using each one suitable unipolar, polar and bipolar Encoders. [6]
 b) Compare single tone-AM with that of double-tone with basic mathematical formulations and performance parameters. [5]
 c) Describe ASK, PSK and FSK with signal diagrams. [3]
5. a) Compare digital and analog hierarchies with detailed block diagram showing number of channels and data-rate. [4]
 b) Demonstrate the operation of CDMA for 8 users among whom three users are sending bit 1, three users are sending bit 0 and remaining two are silent. [4]
6. Write short notes on (Any Two): [2×4]
 - a) Evolution of mobile communication technologies from 1G to 5G
 - b) Checksum
 - c) LAN vs MAN
 - d) Packet switching vs circuit switching

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2082 Bhadra

Exam.	Regular (New Course)		
Level	BE	Full Marks	60
Programme	BCT	Pass Marks	24
Year / Part	II / II	Time	3 hrs.

Subject: - Data Communication (ENCT 253)

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1. Using suitable generic real-world examples of digital communication systems, compare the functioning of half- and full-duplex modes. [5]
2. a) With suitable examples, explain how time invariance of a system is checked. [5]
b) Plot the magnitude and phase spectrums of ;

$$x(t) = 6 - 8\sin(2\pi 160t + 30^\circ) - 6\cos(\pi 160t - 50^\circ) + 2\sin(300\pi t + 120^\circ).$$
 [4]
3. a) Compare coaxial cable, twisted pair, and optical fiber based on bandwidth, cost, and use case. [2]
b) Encode "I'm 100% OK." using weighted Huffman Encoder, and find the transmission efficiency. [5+1]
c) Determine and correct the error bit in the even parity received Hamming codeword of 1110011. [5]
4. a) Draw the waveform for the bit sequence 1000000000101 using each one suitable unipolar, polar and bipolar encoders. [6]
b) Compare AM and FM with basic mathematical formulations and signal diagrams. [7]
c) Describe PCM with a block diagram. [3]
5. a) Compare digital and analog hierarchies with detailed block diagram showing number of channels and data-rate. [4]
b) Demonstrate the operation of CDMA for 8 users among whom four users are sending bit 1, two users are sending bit 0 and remaining two are silent. [5]
6. Write short notes on (Any Two): [2×4]
 - a) Evolution of mobile communication technologies from 1G to 5G
 - b) CRC-4
 - c) LAN vs WAN
 - d) FHSS and DSSS
