

POKHARA UNIVERSITY

Level: Bachelor
Programme: BE
Course: Data Communication

Semester: Spring

Year : 2013
Full Marks: 100
Pass Marks: 45
Time : 3hrs.

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

Attempt all the questions.

- a) What are the data communication terminologies? Write about evolution of data communication system. 8
 - b) Illustrate a situation when baud rate can be lower than bit rate. Also discuss the function of RS-232C interface in brief. 7
 - c) Differentiate energy and power signal. Is the system $y(n)=n.x(n)$ is
 - i. Linear
 - ii. time variant
8
 - d) Sketch the given signal and obtain its Fourier series. 8
- $X(t) = 0, -T/2 < t < -T/4$
 $A, -T/4 < t < T/4$
 $0, T/4 < t < T/2$
- e) Briefly explain TCP/IP layers and compare it with OSI reference model. 7
 - f) Explain the importance of error control and flow control in communication system. Briefly explain sliding window flow control technique. 8
 - g) What are guided and unguided transmission media? Discuss the advantages of fiber optic over other guided media. 7
 - h) State various data compression techniques used in data communication. Explain one of them in detail. 7
 - i) What is the necessity of modulation? Draw and explain the block diagram of PCM system. 8
 - j) Explain the term multiplexing and switching. What are the components of Private Branch Exchange. 8

6. a) Which frequency ranges are of interest in unguided transmission media? Explain the different modes of propagation of electromagnetic signals.
- b) Differentiate between encoding and modulation. Encode the bit stream 1100001011 using
 - i. Polar RZ
 - ii. Polar NRZ
 - iii. AMI
 - iv. Manchester
 - v. HDB3
7. Write short notes on: (Any Two)
 - a) DPSK
 - b) Unipolar and Bipolar encoding
 - c) Unit step function and impulse function.

POKHARA UNIVERSITY

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Semester: Fall

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Attempt all the questions.

1. a) Differentiate between analog and digital data transmission, which one will you prefer for long distance transmission and why? 7
- b) Differentiate between
 - i. Synchronous and asynchronous communication
 - ii. Serial and parallel transmission.
8
2. a) Define system. For the system described by characteristics equation: $y(t) = Ax(t) + B$, determine whether the system is,
 - i. Linear or non-linear
 - ii. Casual or non-causal
 - iii. Stable or unstable
 - iv. Shift variance or shift invariance
 - v. Static or dynamic.
7
- b) Obtain the fourier series of following signal. 8

$$X(t) = -A, \text{ for } -\frac{T}{2} < t < -T/4$$

$$+A, \text{ for } -\frac{T}{4} < t < +T/4$$

$$-A, \text{ for } +\frac{T}{4} < t < +T/2$$

3. a) What is ALOHA and what are its drawbacks? How CSMA/CD overcomes it? Explain. 7
- b) Compare the characteristics of twisted-pair cable and co-axial cable. Explain different propagation modes in unguided communication. 8
4. a) What is redundancy? Explain the operation of CRC for error detection purpose with an example. 7

- b) Differentiate between FDM and TDM. Explain the advantages and disadvantages of packet switching.
5. a) Why is stop-and-wait ARQ inefficient? Explain the major difference between Go-back-N ARQ and selective-reject ARQ.
- b) Differentiate between pulse code modulation and delta modulation.
- c) Explain the need for multiplexing and switching in data communication.
6. a) Differentiate encoding and modulation. The sequence of the bit is 010111100. What will be the output if following encoding schemes are used?
 - i. AMI
 - ii. NRZ
 - iii. NRZ-L
 - iv. RZ
 - v. Differential Manchester.
- b) What is unit step function and unit impulse function? Obtain the Fourier transform of unit impulse function. 7
7. Write short notes on: (Any Two)
 - a) RS-232C Interface Standard
 - b) Encoding Vs. modulation
 - c) QPSK modem.

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Attempt all the questions.

i) What is data communication? Explain the data communication block diagram with an example. 8

b) What are the basic system properties? Explain. Determine whether $x(t) = 5t^2$ is linear or not. 7

a) Check whether $x(t) = \text{Acos } \omega t$ is power or energy type signal. 7

b) Calculate the Fourier transform of:
 i. Unit step function.
 ii. Signum function. 8

a) Describe each layer of OSI reference model. Compare it with TCP/IP. 8

b) Define antenna. Explain different types of antenna. 7

a) Explain different types of signal impairments in communication system. 8

b) What is ARQ? How does stop and wait ARQ and sliding window ARQ deals with error. 7

a) What is packet switching? How the input circuit can be multiplexed in analog hierarchy. 7

b) What is PBX? List the advantage of PBX in communication. 5

a) Define Modulation. Explain the use of modulation. 5

b) What is DC wonder? Using HDB3 technique generates the signal response for this code 1100011100001. 5

c) Define modem and explain the High speed modem (56 modem). 5

7. Write short notes on: (Any two) 2×5

a) Line configuration.
 b) Energy Vs. Power signal.
 c) Cellular Telephony. 1

POKHARA UNIVERSITY

Level: Bachelor Semester: Fall Year : 2015
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- iii. AMI.
iv. Manchester.
v. HDB3.
7. Write short notes on: (Any two)
a) Cellular Telephony.
b) QPSK modem.
c) Analog hierarchy.

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

Attempt all the questions.

1. a) Describe the block diagram of data communication system. How is digital transmission superior to analog transmission system? 8
- b) Discuss different types of serial data transmission .Also illustrate a situation when baud rate can be lower than bit rate. 7
2. a) Define energy and power signals. Explain basic system properties with example of each. 7
- b) Find the Fourier transform of unit step function. Why mathematical tool like Fourier series and Fourier transform are used in engineering? 8
3. a) Which multiple access technology is used in Ethernet? How does this detect and handle collision during data transmission? Explain. 7
- b) Explain basic network characteristics of x.25, frame relay and ATM? 8
4. a) What are guided and unguided transmission media? Discuss the advantages of fiber optic over other guided media. 8
- b) How is burst error difficult to handle than single bit error? Explain 7
hamming code of error correction.
5. a) Why is flow control necessary? Explain sliding window flow control mechanism. 7
- b) What is significance of switching? Explain different multiplexing techniques briefly with application of each. 8
6. a) How does BPSK differ from DPSK? How does Delta modulation overcome the demerits of PCM? Explain. 8
- b) Differentiate between encoding and modulation. Encode the bit stream 1110000101 using:
 - i. Polar RZ.
 - ii. Polar NRZ.1

POKHARA UNIVERSITY

Level: Bachelor
Semester: Fall
Programme: BE
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Attempt all the questions.

- L. a) Explain the applications of data communication. Explain different serial communication modes. 8
- b) Define Baud Rate. Explain RS 232C Standards. 7
2. a) Explain the benefits we get when we replace analog transmission with digital transmission. 7
- Check causality and time-invariance of a signal:
 $y(t)=x(t)+5u(t-5)$
- b) Define LTI systems. Explain significance of frequency domain analysis of signals. 8
3. a) How will you determine whether a signal is power signal or energy signal? Explain. Find Fourier transform of unit impulse signal. 7
- b) Define network Topology. Explain CSMA/CD with necessary diagrams. 8
4. a) Explain CRC method for detection and correction of error. Explain how data link handles lost and duplicate frames that carry data acknowledgements. 7
- b) Explain the advantages and disadvantages of Stop-and-wait ARQ. 8
5. a) Explain wave-division multiplexing. 7
- b) Define multiplexing. Differentiate between Circuit Switching and Packet Switching. 7
6. a) What do you mean by modulation and demodulation? Explain FM. 8
- b) Explain different methods to convert analog signal into digital data. 7
7. a) Explain Delta Modulation. Enumerate QPSK Modem in detail 8
- a) Data Compression 2×5
- b) PBX
- c) VSAT

POKHARA UNIVERSITY

Semester: Spring

Year : 2016

Full Marks: 100

Pass Marks: 45

Time : 3 hrs.

Level: Bachelor
Programme: BE
Course: Data Communication

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.
Attempt all the questions.

Answer the working of data communication system with block diagram. What are the merits of digital data transmission over analog data transmission between

b) Differentiate between synchronous and asynchronous communication

i. Synchronous and parallel transmission

ii. Serial and parallel transmission. For a RF signal with

Define channel capacity with necessary theorem. For a RF signal with average power 2W where band width 6MHz and it is transmitted with average power 2W where

1. a) Define channel capacity with necessary theorem. For a RF signal with average power 2W where

band width 6MHz and it is transmitted with average power 2W where

1.2m W noise signal is present on it. If this signal is digitized and sent

1.2m W noise signal is present on it. If this signal is digitized and sent

7

find the maximum data rate of the channel:

b) Find Fourier series representation of a signal:

$-T/2 < t < T/2$

8

Find Fourier series representation of a signal:

$x(t)=|A|$

7

a) Explain unit step function and impulse function. Obtain the Fourier

transform of a unit step signal.

8

transform of a unit impulse signal.

transform unit impulse signal.

7

transform characteristics of twisted-pair cable and co-axial cable.

8

Explain different propagation modes in unguided communication.

7

Explain different propagation modes in unguided communication.

8

Explain different propagation modes in unguided communication.

8

Explain different propagation modes in unguided communication.

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Explain different propagation modes in unguided communication.

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Explain different propagation modes in unguided communication.

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Explain different propagation modes in unguided communication.

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Explain different propagation modes in unguided communication.

8

Explain different propagation modes in unguided communication.

7

Explain different propagation modes in unguided communication.

8

Explain different propagation modes in unguided communication.

7

- are used?
- i. AMI
 - ii. NRZ
 - iii. NRZ-L
 - iv. RZ
 - v. Differential Manchester
- 7
7. Write short notes on: (Any two)
 - a) Encoding Vs Modulation,
 - b) RS-232C Interface Standard
 - c) VSAT

POKHARA UNIVERSITY

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Attempt all the questions.

1. a) Describe the block diagram of data communication system. Write unique features of digital transmission system. 4+4
 - b) Differentiate parallel and serial transmission. Explain different modes of serial transmission. 3+4
 2. a) Explain Null-modem configuration in RS-232C. Explain the relationship between baud rate and bit rate. 5+3
 - b) Explain maximum channel capacity of noiseless and noisy channel. 7
 3. a) Define energy and power signals. Explain why a sinusoidal wave is periodic and deterministic signal. 3+4
 - b) Explain unit step function and impulse function. Obtain the Fourier transform of unit impulse signal. 3+5
 4. a) Compare the characteristics of twisted-pair cable and co-axial cable. 4+3
 - b) Explain Frame Relay. Write the advantages of layered network model. 4+4
 5. a) How is burst error difficult to handle than single bit error? Explain why CRC is better than parity method of error detection. 3+4
 - b) Why is flow control required in data communication? Explain how lost and duplicate packets are handled by selective repeat request ARQ. 3+5
 - c) Differentiate between FDM and TDM. Compare Virtual-circuit network with Datagram network. 4+4
 - b) Explain phase modulation and frequency modulation. 7
- Write short notes on: (Any two)
- a) Response of a system 7
 - b) Lossless and lossy compression 2×5
 - c) QPSK modem

POKHARA UNIVERSITY

Semester: Spring

Year : 2018
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Course: Data Communication

Candidates are required to give their answers in their own words as far as practicable.

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Attempt all the questions.

1. a) Draw a generic digital model of a data communication system and explain in brief the basic signal processing operations at each block. 7
- b) Define Baud rate. An analog signal has a bit rate of 8000 bps and a baud rate of 1000 baud. How many data elements are carried by each signal element? How many signal elements do we need? 7
- c) What is a system? How would you say that a system is BIBO stable? 7
2. a) Comment about the stability for the following system:

$$y(n)=2x(n+1) + [x(n-1)]^2$$
 8
- b) Why do we need Fourier transform even we have Fourier series? Find Fourier transform of unit step signal and signum signal. 7
3. a) Find Fourier series coefficient of $x(t) = 1+\sin w_0 t + \cos w_1 t$ and plot magnitude spectrum. 8
- b) OSI layer architecture is a reference model. Support this statement and explain the basic function of each layer. 7
4. a) Explain the different error control mechanism using stop and wait power of a signal at 5km? Comment on a result. 7
- b) Explain the different transmission media? Explain the modes of transmission used in fiber optic cable. 8
5. a) Explain the different methods. Compare and Contrast Go back-n ARQ with Repeat ARQ. 8
- b) Explain the multiplexing technique applied in digital telephony with their significance, applications and multiplexing hierarchy. 8
6. a) Differentiate Encoding and Modulation. Explain Differential PSK 8

with an example.

- b) An audio signal of $5\sin(1000\pi t)$ is used for AM with a carrier of $25\sin(10000\pi t)$. Calculate:
- i. Modulation Index
 - ii. Required bandwidth
 - iii. Total power

- iv. Efficiency of AM

7. Write short notes on: (Any two)
- a) Deterministic Vs Random Signals
 - b) Cellular Network
 - c) Data Compression Techniques
 - d) QPSK Modem

POKHARA UNIVERSITY

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Attempt all the questions.

1. a) On a transmission channel, 600 characters message using 7 bit code is used. For sync data stream two sync characters and single error detection is added. In asynchronous data transmission, there is one start bit, one stop bit and error detection character is added. Calculate the efficiency of transmission in both transmission modes. 7
- b) Differentiate between energy and power signal with example. Justify whether $x(t)=e^{-at^2}$ ($a>0$) is energy signal or power signal. 8
2. a) What is unit step function and impulse function to obtain the Fourier transform of unit step function? 7
- b) Why we need Fourier transform even we have Fourier series? Find Fourier transform of periodic signal $x(t)=\sin(0.5t)+\cos(0.5t)$. 8
3. a) Explain TCP/IP layers and compare it with OSI reference model. 7
- b) Compare twisted pair cable, co-axial cable and optical fiber based on frequency range, attenuation, delay and repeater spacing. 8
4. a) How error can be defined? Explain different error detection techniques. 7
- b) Explain the importance of flow control. Briefly explain sliding window flow control mechanism. 8
- a) What is multiplexing? Explain FDM hierarchy in telephone system. 7
- b) Differentiate between encoding and modulation. With diagram, explain QPSK technique. 8
- a) What are the different techniques of multiplexing? 7
- b) An audio signal of $10\sin 1000\pi t$ is used for AM with a carrier of $50\sin 20000\pi t$. Calculate: 8

- i) Modulation Index
- ii) Required bandwidth
- iii) Total power
- iv) Efficiency of AM

7. Write short notes on: (Any two)

- a) VSAT
- b) Digital Data Transmission
- c) Private Branch Exchange

2x5

POKHARA UNIVERSITY

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Attempt all the questions.

1. a) Explain digital communication system with its block diagram. 8
 b) Define Baud rate. An analog signal has a bit rate of 8000 bps and a baud rate of 1000 baud. How many data elements are carried by each signal element? How many signal elements do we need?
2. a) Differentiate between energy and power signal with example. Justify whether $x(t) = e^{-at^2}$ ($a > 0$) is energy signal or power signal 8
 b) Define LTI system. Find output of LTI system with input signal $x(t)=u(t)$ and impulse response $h(t)=u(t)$. 7
3. a) Find Fourier series coefficients of signal $x(t)=1+\sin w_0 t+\cos w_0 t+\cos(2w_0 t+\pi/4)$. 7
 b) Why we need Fourier transform even we have Fourier series? Find Fourier transform of periodic signal $x(t)=\sin(0.5t)+\cos(0.5t)$. 8
4. a) Describe X.25, Frame Relay and ATM briefly. 8
 b) Compare twisted pair cable, co-axial cable and optical fiber based on frequency range, attenuation, delay and repeater spacing.
5. a) What is redundancy? What are different types of errors? Explain their detection and correction techniques. 8
 b) What is ARQ? What are the two types of sliding window ARQ error control? Explain. 7
6. a) What is multiplexing? Explain FDM hierarchy in telephone system. 7
 b) An audio signal of $10\sin(1000\pi)t$ is used for AM with a carrier of $50\sin(20000\pi)t$. Calculate:
 - i. Modulation Index
 - ii. Required bandwidth
 - iii. Total power
- iv. Efficiency of AM 1
7. Write short notes on: (Any two) 2x5
 - a) Satellite Communication
 - b) PCM
 - c) AMI and Manchester Encoding

POKHARA UNIVERSITY

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- iv. Differential Manchester, and its Hierarchy? Compare and contrast different types of switching mechanism.
6. a) Write notes on Analog services and its Hierarchy? Compare and contrast different types of switching mechanism.
- b) What is multilevel modulation? Explain QPSK modulation technique.
7. a) Write short notes on: (Any two)
Continuous and Discrete Time signal
Unguided Transmission Media
- b) Private Branch Exchange
- c) Le Pro C

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Attempt all the questions.

1. a) What are the advantages of Digital data communication over Analog data communication? Draw and explain the generic block diagram of data communication system. 7
- b) Define bit rate and Baud rate. Explain the RS-232C standard with handshake signals. 8
2. a) How do you classify the signal? Differentiate energy and power signal. 7
- b) Explain OSI reference model as a layered architecture with function of each layer. 8
3. a) Explain with example how Fourier Transform helps on the analysis of signal. 7
- b) Define unit impulse and unit step function. Obtain the Fourier transform of a single sided exponential function of e^{at} . 8
4. a) What do you mean by propagation? Why do we need it? Explain with different propagation mechanism. 8
- b) Explain how error can be controlled using stop and wait methods and sliding window method. Also mention the advantages and disadvantages for both the methods. 8
5. a) Define impairments. What are the basic signal impairments in communication system? Explain. 8
- b) Differentiate encoding and modulation. The sequence of the bit is 0101000011. What will be the output if following encoding schemes are used? 7
- i. AMI
 - ii. NRZ-L
 - iii. Binary 3 Zero Substitution (B3ZS)

POKHARA UNIVERSITY

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7
 2×5
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 as practicable.
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Attempt all the questions.

1. Explain data frame format of synchronous and asynchronous communication and differentiate them.
 a) communication and differentiatiate them.
 b) Check whether the given system is linear, causal and time invariant or not.
- $y(t) = \log x(t)$
 - $y(t) = t^*x(t)$
2. a) What is the importance of using mathematical tool like Fourier Series and Fourier Transform in engineering? Find the Fourier transform of signum function.
- b) Explain TCP/IP model with the protocols associated with each layers of this model.
- Also explain the concept of addressing in wireless signum function.
3. a) Explain the electromagnetic spectrum and its application in wireless transmission media with their modes of propagation.
 b) What is the purpose of hamming code? Consider the following message $M = 1010001101$. The cyclic redundancy check (CRC) for this message using the divisor polynomial $x^5 + x^4 + x^2 + 1$ calculate error free.
- $M = 1010001101$
- $x^5 + x^4 + x^2 + 1$
- $4+4$
4. a) Define unit step signal and unit impulse signal. Prove that convolution message at receiver. Define unit step signal corresponds to multiplication in frequency domain. Define unit step signal corresponds to multiplication in time domain. Explain how stop-and-wait message at receiver. Define flow control. Explain how stop-and-wait message at receiver. Define flow control and error control.
- b) Define flow control operate.
5. a) Describe the goals of multiplexing. Differentiate between FDM and ARQ protocol operate. ARQ protocol occupies a bandwidth of 4 KHz
- Describe the goals of multiplexing. Differentiate between FDM and ARQ protocol operate. ARQ protocol operates a bandwidth of 500 Hz
- TDM. Assume that a voice channel occupies a guard bands of 500 Hz
- We need to multiplex 10 voice channels

using FDM. Determine the bandwidth of the link. Also show the multiplexing scheme diagrammatically.

- b) Encode the bit stream 10110001110 using the following scheme

- RZ
- NRZ-I
- NRZ-L
- AMI
- Manchester

6. a) An audio signal of $20\sin 2\pi 500t$ is used for AM with a carrier of $60\sin 2\pi 10^4 t$. Calculate
- Modulation index
 - Required bandwidth
 - Total power using load resistance of 8Ω
 - Efficiency of AM

7. Write short notes on: (Any two)
- Models of a data communication
 - Cellular telephony
 - Energy Vs Power Signal

8. a) Explain TCP/IP model with the protocols associated with each layers of this model.
- b) Explain the concept of addressing in wireless signum function.

- Also explain the concept of addressing in wireless signum function.

8. a) Explain the electromagnetic spectrum and its application in wireless transmission media with their modes of propagation.

- b) What is the purpose of hamming code? Consider the following message $M = 1010001101$. The cyclic redundancy check (CRC) for this message using the divisor polynomial $x^5 + x^4 + x^2 + 1$ calculate error free.

$4+4$

7

8

POKHARA UNIVERSITY

Level: Bachelor
Programme: BE
Course: Data Communication

Semester: Fall

Year : 2020
Full Marks: 100
Pass Marks: 45
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Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

Attempt all the questions.

1. a) Explain the evolution of data communication. Draw and explain in brief a model of a data communication system. 8
- b) What is serial and parallel data transmission? Differentiate between synchronous and asynchronous data transmission. 7
2. a) Comment about the linearity, stability, time-invariance and causality for the following system: $y(t)=t^2 x(t)$ 8
- b) Why OSI layer is called referenced model. Explain session layer and presentation layer in brief. 7
3. a) Justify "Fourier transform is essential in data communication" with relevant examples. Find Fourier Transform of the signal e^{-at} . Plot magnitude and phase response. 4+7
- b) Compare Impulse function and impulse response. 4
4. a) What are different modes of propagation in wireless communication? Explain merits and demerits of optical fiber. 8
- b) Explain how redundancy is introduced in parity method of error detection and correction. 7
5. a) Explain the need of data compression in data communication. 8
How is data link error control different from flow control? Explain
- b) Explain the multiplexing technique applied in digital telephony with their significance, applications and multiplexing hierarchy. 7
6. a) What is Line Coding? Represent the given sequence of bits 111000010 using:
 - i. AMI
 - ii. HDB3
 - iii. NRZ

- b) Explain PCM as an A to D conversion technique with diagram. 5
- c) Compare encoding and modulation technique. 4
7. Write short notes on: (Any two) 2x5
 - a) Circuit, message and packet switching
 - b) Energy and power signal
 - c) VSAT

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1. a)

b)

2. a)

3.

4.

5.

Level: Bachelor
Programme: BE

Course: Data Communication

POKHARA UNIVERSITY

Semester: Fall

Year : 2021

Full Marks: 100

Pass Marks: 45

Time : 3hrs.

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Attempt all the questions.

- a) Draw a generic digital model of a data communication system and explain in brief the basic signal processing operations at each block. 7
- b) Explain the concept of bit rate, baud rate. Explain data frame format of synchronous and asynchronous communication. 8
- c) Find the energy and power of signal $x(t)=e^{-at} \cdot u(t)$ and justify whether it is energy signal or power signal. 8
- d) What is a system? How would you say that a system is BIBO stable? 7
- e) Comment about the stability for the following system:
 $y(n)=2x(n+1) + [x(n-1)]^2$ 7
- f) Why we need Fourier transform even we have Fourier series? Find Fourier transform of unit step signal and signum signal. 8
- g) OSI layer architecture is a reference model. Support this statement and explain the basic function of each layer. 7
- h) Compare coaxial cable, twisted pair cable and optical fiber with their performance. 8
- i) Explain different methods for the detection and correction of single bit error and burst error. 8
- j) What is ARQ? What are the two types of sliding window ARQ error control? Explain. 7
- k) Explain the multiplexing technique applied in digital telephony with their significance, applications and multiplexing hierarchy. 7
- l) What is line coding? Represent the given sequence of bits 111000011 using:
i. NRZ-I
ii. Differential Manchester
iii. HDB3 7

b) How an analog signal is converted into digital? Explain QPSK as an multilevel modulation with necessary diagram. 8

7. Write short notes on: (Any two)

- a) Optical fiber Communication
b) QAM modulation
c) Circuit switching Vs packet Switching

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The figures in the margin indicate full marks.

Attempt all the questions.

1. a) Describe the block diagram of data communication system. How is digital transmission superior to analog transmission system? 8
- b) Differentiate parallel and serial transmission. Explain different modes of serial transmission. 7
2. a) Explain Null-modem configuration in RS-232C. Explain the relationship between baud rate and bit rate. 8
- b) State the properties of Continues time fourier series. 7
3. a) Define energy and power signal. Determine whether the signal $x(t) = A[u(t+a) - u(t-a)]$ for $a>0$ is a Power signal or energy signal. 8
- b) For a given signal $x(t) = \cos\omega t$. Find the magnitude and phase spectrum. 7
4. a) Differentiate between OSI layer and TCP/IP layer. State the role of CSMA/CD in data communication networking. 7
- b) Compare guided transmission media in terms of bandwidth, channel capacity, SNR, security and cost. 8
5. a) Explain different types of data compression techniques in data communication. Highlight its importance in communication. 8
- b) Compare asynchronous and synchronous data-link protocols. 7
6. a) Differentiate between AM and FM. Why is FM superior over AM in communication? 8
- b) Draw ASK, FSK and PSK of the given binary sequence: 0100110011001010. 7
7. Write short notes on: (Any two) 2×5
 - a) Satellite Communication
 - b) Packet switching and message switching
 - c) ATM and Frame Relay

POKHARA UNIVERSITY

Level: Bachelor
Programme: BE
Course: Data Communication

Semester: Fall

Year : 2022
Full Marks: 100
Pass Marks: 45
Time : 3 hrs.

Candidates are required to give their answers in their own words as far as practicable.
The figures in the margin indicate full marks.
Attempt all the questions.

1. a) Why data communication is important? Draw and explain a generic data communication model. 7
1. b) Differentiate between different types of transmission modes. Briefly explain RS-232C. 8
1. a) Define LTI system. Explain with examples, how periodic and non periodic signals are distinguished. 8
1. b) Check whether $x(t)=A \cos \omega t$ is power or energy type signal. 7
3. a) Define discrete time Fourier series. Find the Fourier transform of unit impulse function. 8
3. b) List the different types of network and explain its topology. 7
4. a) Why wireless propagation is important? Explain types of propagation. 7
4. b) Enlist the advantages of optical fibre? Explain working principle of optical fibre. 8
5. a) Why burst error is difficult to handle than single error? Explain why CRC is better than parity method of error detection. 7
5. b) Why flow control is needed? Explain sliding window flow control algorithm in detail. 8
6. a) Compare and contrast between circuit switching, packet switching and message switching. 8
6. b) What is modulation? Explain QPSK modulation in detail. 7

1. Write short notes on: (Any two)

- a) Band Rate
- b) PCM
- c) Modems

POKHARA UNIVERSITY

Level: Bachelor
Programme: BE
Course: Data Communication

Semester: Spring

Year : 2023
Full Marks: 100
Pass Marks: 45
Time : 3hrs.

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The figures in the margin indicate full marks.

Attempt all the questions.

1. a) What are standards? Explain its types. Also explain the standard organizations in data communication. 8
- b) Define bit rate and baud rate? Explain with a scenario to show bit rate is not always equal to baud rate with suitable diagram and calculations. 7
2. a) Define Time Invariant System. Explain the following properties of the systems: a) causality b)linearity c)stability d)memory 8
- b) Explain deterministic and random signal with example. Justify whether unit step signal is energy signal or power signal 4+3
3. a) Explain the existence of Fourier Transform. Find the Fourier Transform of Signum function. 7
- b) Compare and Contrast Frame relay, X.25 and ATM. 8
4. a) Why optical fiber is considered advantageous over other copper media? Explain. Also, explain about different propagation techniques. 8
- b) A bit stream is 10011101 is transmitted using the standard CRC method. The generator polynomial is x^3+1 . Derive the actual bit string transmitted. Show that the error is detected if any one bit in the received bit stream is inverted. 7
5. a) Define flow control as a layered protocol model. Explain the mechanism of a flow control for an ARQ model. 8
- b) Compare and Contrast between Virtual Circuit Network and Datagram network. 7
- a) Differentiate between encoding and modulation? Explain differential PSK with an example. 7
- b) How modulation helps to reduce the size of antenna, illustrate in brief. Explain about, amplitude, frequency and phase modulation. 8

7. Write short notes on: (Any two)

- a) Synchronous and asynchronous Communication
- b) Types of Switching
- c) TCP/IP VS OSI Model