

Government College of Engineering, Amravati
(An Autonomous Institute of Government of Maharashtra)

Fourth Semester B. Tech. (CS / IT)

Summer Term - 2016

Course Code: ITU402

Course Name: Data Communication

Time: 2 hr. 30min.

Max. Marks: 60

Instructions to Candidate

- 1) All questions are compulsory.
- 2) Assume suitable data wherever necessary and clearly state the assumptions made.
- 3) Diagrams/sketches should be given wherever necessary.
- 4) Figures to the right indicate full marks.

1 Solve the following.

- | | | |
|------------|--------------------------------------------------------------------------------------------------------------------------------------|----------|
| (a) | What is piggybacking? What is its advantage? | 4 |
| (b) | The digital signal is to be designed to permit 160 kbps for a bandwidth of 20 KHz. Determine (a) number of levels and (b) S/N ratio. | 3 |
| (c) | Distinguish between circuit switching and packet switching. | 3 |
| (d) | What is bit-stuffing? | 2 |

Cont.

2

Solve any two of the following.

12

- (a) Explain different aspects of ASK, FSK technique.
- (b) Explain the key features of TDM. How synchronous TDM differs from asynchronous TDM.
- (c) Compare and contrast different network topologies.

3

Solve the following.

12

- (a) A sender needs to send the four data items 0x3456, 0xABCC, 0x02BC, 0xEEEE. Find
 - (i) checksum at the receiver site if there is no error.
 - (ii) Checksum at receiver site if the second data item is changed to 0xABCE
 - (iii) Checksum at receiver site if second data item is changed to 0xABCE and third item is changed to 0x02BA
- (b) Design algorithm for Go-Back-N sender site and receiver site.

4

Solve any two of the following.

12

- (a) Explain Datagram Packet switching in details.
- (b) Explain:
 - (i) Unguided Media
 - (ii) time & frequency domains.
- (c) Describe polar line coding scheme in details.

- (a) Draw graph for data stream 01001110 using following coding scheme.
- (i) RZ
 - (ii) Differential Manchester
 - (iii) AMI
 - (iv) NRZ-I
- (b) Explain how two-dimensional parity check and checksum is used to detect error.

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Q.1 Solve the following. 12

- (a) Explain OSI Reference model with neat figure.
- (b) Define transmission medium. How do guided media differ from unguided media?

Q.2 Solve any two of the following. 12

- (a) What is multiplexing? Explain TDM.
- (b) Explain non uniform quantization and how to recover original signal using PCM decoder.
- (c) Explain analog to analog conversion in details.

Q.3 Solve any two of the following. 12

Contd

- (a) Explain phase shift keying in detail. Compare it with FSK.
- (b) What is a draw back of Go Back-n protocol? How it is overcome in the selective repeat protocol.
- (c) Define and explain the concept of Wavelength division multiplexing.

1.4 Solve any two of the following. 12

- (a) Explain character oriented protocol in details.
- (b) Explain the role of Hamming code in error detection and correction with example.
- (c) Explain message switching in details.

1.5 Solve the following. 12

- (a) Explain flow control and error control.
- (b) Differentiate between circuit switching and packet switching

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1. Solve any two of the following. 12

- (a) Explain the functions of session, presentation and application layer in detail.
- (b) Describe different topologies in which a network is laid out Physically.
- (c) Explain the different transmission impairments that affect data communications

2. Solve any two of the following. 12

- (a) Differentiate between Manchester and differential Manchester encoding methods with relevant wave forms.
- (b) Explain the PCM Technique of changing analog signal to digital signal with neat diagrams of PCM encoder & Decoder.

Contd..

- (c) With a neat diagram, explain FDM with respect to multiplexing and demultiplexing, and mention its applications.

3. Solve the following. **12**

- (a) Explain ASK, PSK in detail.
- (b) Design algorithm for Go-Back-N sender site and receiver site.

4. Solve the following. **12**

- (a) Describe Stop and Wait ARQ protocol.
- (b) Explain, using example, how bit stuffing is used to preserve frame boundaries when transmitting binary data at Data Link Level of protocol stack.

5. Solve any two of the following. **12**

- (a) Describe block coding scheme in details
- (b) Explain Checksum method of error detection with the help of example.
- (c) Draw graph for data stream 01001110 using following coding scheme.
- (i) RZ
 - (ii) Differential Manchester
 - (iii) AMI
 - (iv) NRZ-I

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Max. Marks: 60

Instructions to Candidate

- 1) All questions are compulsory.
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- 3) Diagrams/sketches should be given wherever necessary.
- 4) Figures to the right indicate full marks.

1. Solve the following. 12

- a) What is the purpose of bridge?
- b) Distinguish between serial and parallel transmission.
- c) What do you mean by bit stuffing?
- d) Define flooding?
- e) How distortion and noise affect data communication.
- f) What are functions of applications layer?

Contd..

2. Solve.

- a) Explain the functions of network layer and transport layer in brief. 6
- b) Explain in details Digital to Analog conversion. 6

3. Solve any TWO

- a) Explain Frequency Division Multiplexing. 6
- b) Describe Block Coding technique. 6
- c) Describe the relative advantages and disadvantages of
 - i) Terrestrial links
 - ii) Satellite links and
 - iii) Optical fiber transmission.6

4. Solve any TWO.

- a) Compare circuit switching with packet switching. 6
- b) What are the congestion control policies in
 - i) Data link
 - ii) Network
 - iii) Transport layer ?6
- c) Describe algorithm for Stop-and-Wait ARQ protocol. 6

5. Solve the following.

- a) How checksum is calculated. Calculate the checksum for a text of 8 characters "Forouzan". 6
- b) Explain Polar line coding scheme. 6

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Q.1 Solve the following. 12

- (a) Distinguish between time domain and frequency domain representation of a signal.
- (b) What are the factors responsible for attenuation in case of terrestrial microwave communication?
- (c) What is quantization error? How can it be reduced?
- (d) How the inefficiency of Stop-and-Wait protocol is overcome in sliding window protocol?
- (e) How does Manchester encoding differ from differential Manchester encoding?

- (f) The power of a signal is 10 mW and the power of the noise is 1 μ W; what are the values of SNR and SNRdB?

Q.2 Solve any two of the following. 12

- (a) Describe how Analog to Analog conversion takes place.
- (b) Explain the functions of network layer and transport layer in brief.
- (c) Explain Frequency Division Multiplexing.

Q.3 Solve the following. 12

- (a) How Cyclic Redundancy Check detects error in message transmission? Explain with suitable example.
- (b) Design Sender-site and Receiver-site algorithm for Stop-and-Wait ARQ Protocol.

Q.4 Solve the following. 12

- (a) Compare and contrast Go-Back-N ARQ with Selective-Repeat ARQ.
- (b) Explain circuit switching technique with its key advantages and disadvantages.

Q.5 Solve any two of the following. 12

- (a) Describe following networking devices:
 - (i) Bridge
 - (ii) Router
 - (iii) gateway

- (b) A sender needs to send the four data items 0x3456, 0xABCC, 0x02BC, 0xEEEE. Find
- (i) checksum at the sender site.
 - (ii) Checksum at receiver site if the second data item is changed to 0xABCE
 - (iii) Checksum at receiver site if second data item is changed to 0xABCE and third item is changed to 0x02BA
- (c) Describe NRZ coding system? Draw graph for NRZ-I scheme using each of following data stream.
- (i) 11111111
 - (ii) 00000000
 - (iii) 00110011
 - (iv) 01010101