

# ICT 2156\_Principles of Data Communication\_29\_01\_2022

III SEMESTER B.TECH (IT/CCE)

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5

We can send a maximum of 240 kbps over a noiseless channel with a bandwidth of 20 KHz. How many signal levels do we need?  
(1 Point)

- ☐ 1024
- ☐ 99
- ☐ 64
- ☐ 256

6

One positive side effect of bipolar encoding is that a bipolar violation (two consecutive + pulses or two consecutive - pulses separated by any number of zeros) indicates to the receiver that an error has occurred in transmission. Unfortunately, upon the receipt of such a violation, the receiver does not know which bit is in error (only that an error has occurred). For the received bipolar sequence + - 0 + - 0 - + which has one bipolar violation, construct three scenarios (each of which involves a different transmitted bit stream with one transmitted bit being converted via an error) that will produce this same received bit pattern.

- a. + - 0 + - + - +
- b. + - 0 + 0 0 - +
- c. + - 0 + - 0 + -
- d. + - 0 + - 0 0 +

(1 Point)

- ☐ a,b,d are correct
- ☐ b,c,d are correct
- ☐ c,d,a are correct
- ☐ a,b,c are correct

7

If the sum calculated for the message is all 1s, the internet checksum to be sent to the receiver will be\_\_\_\_\_.

(1 Point)

- ☐ All 1s
- ☐ Alternate of 1s and 0s
- ☐ Checksum is not computed.
- ☐ All 0s

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Which of the signals from the given list use differential encoding?

(1 Point)

- ☐ NRZI
- ☐ Pseudoternary
- ☐ NRZ-L
- ☐ Bipolar-AMI

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A channel has a data rate of 4 kbps and the velocity of propagation of the medium is  $2 \times 10^8$  m/s. The distance of the link is 8000 km. For what range of frame sizes does stop-and-wait give an efficiency of at least 50%?

(1 Point)

- ☐  $\geq 320$
- ☐  $\geq 160$
- ☐  $\leq 160$
- ☐  $\leq 320$

10

For a parabolic reflective antenna with a diameter of 2 m, operating at 10 GHz, what is the antenna gain?

(1 Point)

- ☐ 43.44 dB
- ☐ 39.88 dB
- ☐ 39.44 dB
- ☐ 43.88 dB

11

A \_\_\_\_\_ error means that two or more bits in the data unit have changed.

(1 Point)

- ☐ single-bit
- ☐ more than 2 bit error can not occur
- ☐ double-bit

☐ burst

12

A network transmits 500 bits frame on a shared media of 256 Kbps. Assume that the systems in the network generate 500 frames per second. Calculate the network throughput for pure ALOHA.

(1 Point)

☐ 0.367

☐ 0.135

☐ 0.368

☐ 0.138

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A channel whose length is 150km, has a data rate of 5 Mbps and the velocity of propagation of the medium is  $2 \times 10^8$  m/s. Calculate the bit length of the link.

(1 Point)

☐ 3750 bits

☐ 3575 bits

☐ 3775 bits

☐ 3850 bits

14

The pattern P used in CRC calculation is best chosen depending on

\_\_\_\_\_.

(1 Point)

☐ the implementation method used for calculation of FCS.

- ☐ the type of error we may have to deal with.
- ☐ the bit rate of the channel.
- ☐ solely on the number of bits present in the data word to be communicated.

**15**

Suppose a message of 10 MB is divided into blocks of 1000 Bytes each. All the layers at the OSI model add a 20-Byte header each. Trailer size is 10 Bytes. If the message is to be sent using a point-to-point link, what is the user throughput if the link capacity is 50 Mbps?

(1 Point)

- ☐ 11.5 Mbps
- ☐ 43.47 Kbps
- ☐ 11.5 Kbps
- ☐ 43.47 Mbps

**16**

The signal loses strength due to the different propagation speeds of each frequency that makes up the signal. This is a type \_\_\_\_\_ of transmission impairment.

(1 Point)

- ☐ Decibel
- ☐ Attenuation
- ☐ Distortion
- ☐ Noise

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Determine the height of an antenna for a TV station that must be able to reach customers up to 120 km away.  
(1 Point)

- ☐ 846.66 m
- ☐ 847.40 m
- ☐ 876.66 m
- ☐ 866.66 m

18

\_\_\_\_\_ type of data transmission uses a clock to control the timing of bit sent.  
(1 Point)

- ☐ Clock is not used in any type of transmission
- ☐ Synchronous Transmission
- ☐ Both Synchronous and Asynchronous Transmission.
- ☐ Asynchronous Transmission

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Consider the following 4 statements. Which of the statement(s) is/are are false?

- A) In CSMA/CD, once the entire frame is sent, the station does not keep a copy of the frame and does not monitor the line for collision detection.
- B) The maximum throughput in CSMA/CD is based solely on the persistence method and not on any other parameter (irrespective of whichever persistence method is used).
- C) For non-persistent method, the maximum throughput can go up to 90 percent when G is 1.
- D) The select function in Polling method is used whenever the primary device has something to send.

(1 Point)

- ☐ A and B are false.
- ☐ A and D are false.
- ☐ B and C are false.
- ☐ Only D is false.
- ☐ Only B is false.

20

In a FDM system, 10 channels are multiplexed: Each channel having a BW of 50KHz. If the guard Band between the channels are 1KHz, the minimum bandwidth required for transmission is:

(1 Point)

- ☐ 505KHz
- ☐ 500KHz
- ☐ 509KHz



○ 510KHz

21

The number of shift registers required to calculate FCS using the pattern,  $(x + 1)(x^{15} + x^{14} + x^{13} + x^{12} + x^4 + x^3 + x^2 + x + 1)$  is

(1 Point)

- ☐ 16  
☐ 15  
☐ 1  
☐ 17

22

Which of the following options give the data sequence that is encoded using Manchester encoding represented in the figure.

(1 Point)



- ☐ 1110110100
- ☐ 0001001011
- ☐ 1110011010
- ☐ 0001100101

23

What would be the minimum bandwidth of Manchester and differential Manchester?  
(1 Point)

- ☐ 4 times that of NRZ
- ☐ 2 times that of NRZ
- ☐ 8 times that of RZ
- ☐ 4 times that of RZ

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Consider the use of 2000-bit frames on a 1-Mbps satellite channel with a 320-ms delay. What is the maximum link utilization for Continuous flow control with a window size of 255?  
(1 Point)

- ☐ 40%
- ☐ 79%
- ☐ 76%
- ☐ 47%

25

An isotropic antenna is a point in space:

- a. That radiates power in all directions equally.
- b. That radiates power only in one direction.
- c. Actual radiation pattern is a sphere with the antenna at the center.
- d. Actual radiation pattern is not a sphere with the antenna at the center.

(1 Point)

- ☐ a and d are correct

- ☐ a and c are correct
- ☐ b and c are correct
- ☐ b and d are correct

**26**

If the bandwidth of a signal is 5 KHz and the lowest frequency is 42 KHz, what is the highest frequency?  
(1 Point)

- ☐ 57 KHz
- ☐ 47 KHz
- ☐ 5 KHz
- ☐ 10 KHz

**27**

The power of a signal is 10 mW and the power of the noise is 1  $\mu$ W. The value of SNRdB is \_\_\_\_\_?  
(1 Point)

- ☐ 4
- ☐ 10
- ☐ 40
- ☐ 30

**28**

A signal is measured at two different points. The power is P1 at the first point and P2 at the second point. The dB is 0. This means \_\_\_\_\_.  
(1 Point)

- ☐ P2 equals P1
- ☐ P2 is much larger than P1
- ☐ P2 is zero
- ☐ P2 is much smaller than P1

29

Consider the following 2 statements. Which of the statement(s) is/are true?

A) The probability that a frame arrives with no bit errors decreases when the probability of a single bit error increases, assuming bit error rate is constant and independent of each bit.

B) The probability that a frame arrives with no bit errors increases with increasing frame length, assuming bit error rate is constant and independent of each bit.

C) Forward Error Correction is preferable in satellite communications as compared to retransmission owing to the high values of propagation delay.

(1 Point)

- ☐ Only A is true.
- ☐ A and C are true.
- ☐ Only C is true.
- ☐ A and B are true.
- ☐ B and C are true.
- ☐ Only B is true.

30

For selective reject ARQ, each error generates a requirement to retransmit K frames and the value of K for  $W \geq 2a+1$  is

(1 Point)

- ☐ W+1
- ☐ 2a + 1
- ☐ 2a
- ☐ W

31

Bit stuffing is performed at the receiver and the data received at the receiver is **11111011110111011011011111000**. The original data pattern is:  
(1 Point)

- ☐ 111111111111011011001111100
- ☐ 111111111111011011011111000
- ☐ 11111011110111011011011111000
- ☐ 111111111011101101101111100

32

Assume that a telephone line channel is equalized to allow bandpass data transmission over a frequency range of 600 to 3000 Hz. The available bandwidth is 2400 Hz. For  $r=1$ , evaluate the required bandwidth for 2400 bps QPSK.  
(1 Point)

- ☐ 3200Hz
- ☐ 2600Hz
- ☐ 2400Hz
- ☐ 1200Hz

33

Given a dataword length of size 2 and a codeword size of 5, how many errors can always be detected and corrected? Consider  $t=1$ .  
(1 Point)

- ☐ 1-bit error always detected, 1-bit error always corrected.
- ☐ 1-bit error always detected, 2-bit error always corrected.
- ☐ 2-bit error always detected, 2-bit error always corrected.
- ☐ 2-bit error always detected, 1-bit error always corrected.

34

A telephone line is known to have a loss of 30 dB. The input signal power is measured as 0.5 W, and the output noise level is measured as  $2.5\mu\text{W}$ . Using this information, calculate the output signal-to-noise ratio in dB  
(1 Point)

- ☐ 23.01 dB
- ☐ 23.99 dB
- ☐ 26.59 dB
- ☐ 26.99 dB

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