

PRINCE OF SONGKLA UNIVERSITY
FACULTY OF ENGINEERING

Final Examination: Semester II

Academic Year: 2009

Date: 25 February 2010

Time: 13.00 – 16.30

Subject: 241-360 Introduction to Communication Systems and Networks Room: Robot

ทฤษฎีในการสอบ โทษขั้นต่ำคือ ปรับตกในรายวิชาที่ทฤษฎี และพักการเรียน 1 ภาคการศึกษา

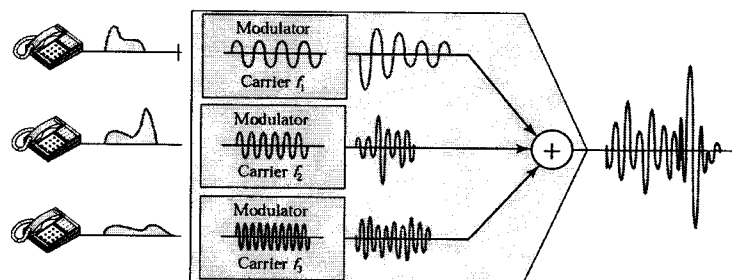
Instructions

1. Attempt to answer all questions.
2. There are 11 questions, 14 pages (including this page)

1. Select the best answer (10 marks)

	a	b	c	d	e
1.1					
1.2					
1.3					
1.4					
1.5					

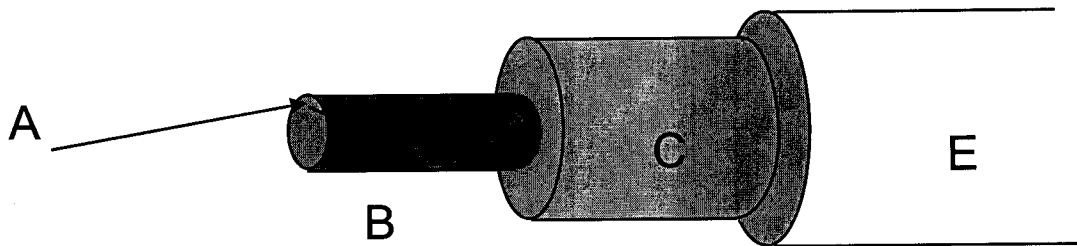
1.1 What kind of multiplexing used by the below scheme?



- a) FDM

- b) TDM
- c) SDM
- d) CDM
- e) No correct answer

1.2 Which answer is correct?

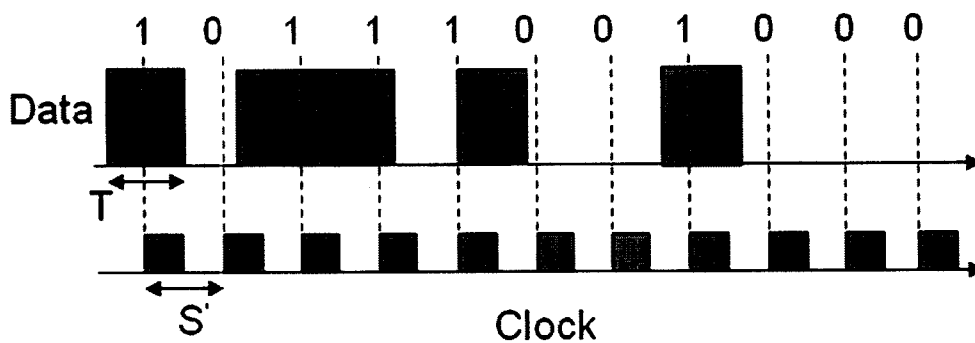


- a) A = Core, B = Light, C = Jacket, E = Cladding
- b) A = Light, B = Cladding, C = Jacket, E = Core
- c) A = Light, B = Cladding, C = Core, E = Jacket
- d) A = Light, B = Core, C = Cladding, E = Jacket
- e) No correct answer

1.3 Which one is the advantage of WDM (Wave Division MUX)

- a) can be used for twisted-pair
- b) can be used with TDM switch
- c) give more channels than TDM and FM
- d) has a lower attenuation than TDM and FM
- e) all are correct.

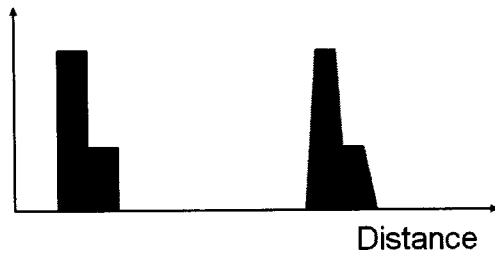
1.4 What is the cause of this figure?



- a) synchronization
- b) multiplexing

- c) attenuation
- d) data loss
- e) no correction answer

1.5 What is the effect cause of the below picture?



- a) Propagation
- b) Distortion
- c) Attenuation
- d) Noise
- e) No correct answer

2. Hamming Code can be applied for FEC (forward Error Correction) technique, as shown below (10 Marks)

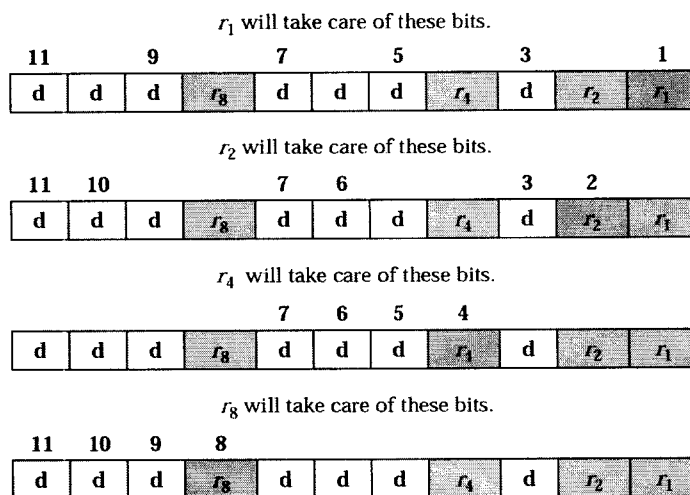


Figure 1 Redundant bit calculation using Hamming Code

a. If the original data is 1001101, what is the data code after using Hamming Code?

3. Use the figure below, which is Go-Back-N ARQ scheme, to answer the following questions (please try to give your reasons to support your answers): (10 Marks)

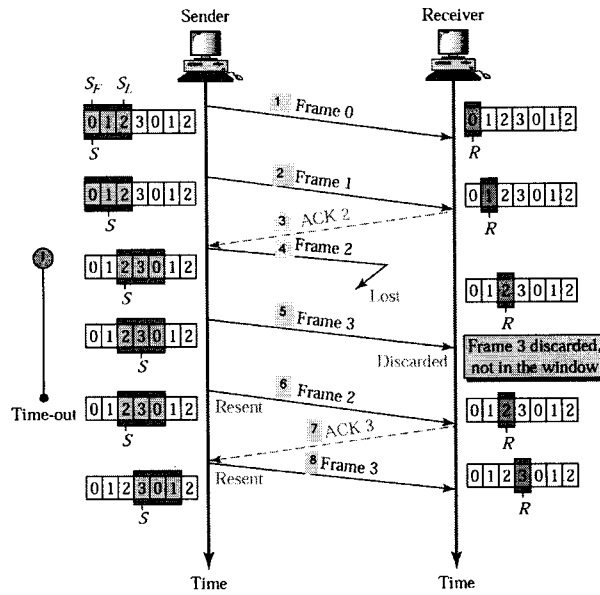


Figure 2 Go-Back-N operation

Answer the following questions for Go-Back-N ARQ:

a. Why does the receiver not answer ACK of Frame 0 (step no. 1)?

Answer

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b. What happen if the receiver does not give ACK2 (step no. 3)?

Answer

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c. What happen if the receiver does not send ACK 3 (step no. 7)?

Answer

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d. In Go-Back-N ARQ, a window size must be less than a number of data unit in one block (2^m-1). Why?

Answer

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4. Below is the Selective Repeat ARQ operation. Answer the following questions: (10 Marks)

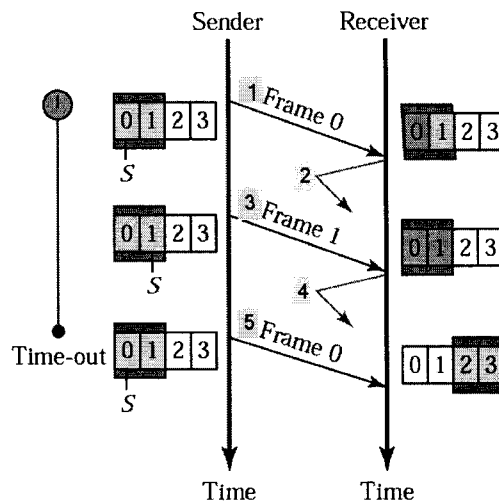


Figure 3 Selective Repeat ARQ operation

a. What will happen in step no. 6 and 7?

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b. If ACK of step no 4 is received by the sender, what will happen in step no. 5?

Answer

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5. In a Stop-and-Wait ARQ system, the bandwidth of the line is 100 Mbps, and 1 bit takes 10 ms to make a round trip. What is the bandwidth-delay product? If the system data frames are 1000 bits in length, how long does it take to transmit 10 Mbytes data? Assume that all data are received correctly, e.g. no error and dropped. (10 Marks)

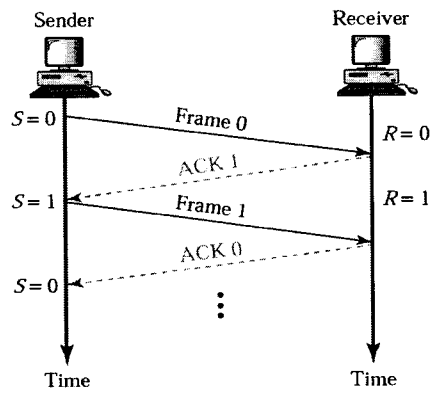


Figure 4 Stop-and-Wait ARQ operation

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6. For media selection criterion, please answer the following topics. (10 Marks)

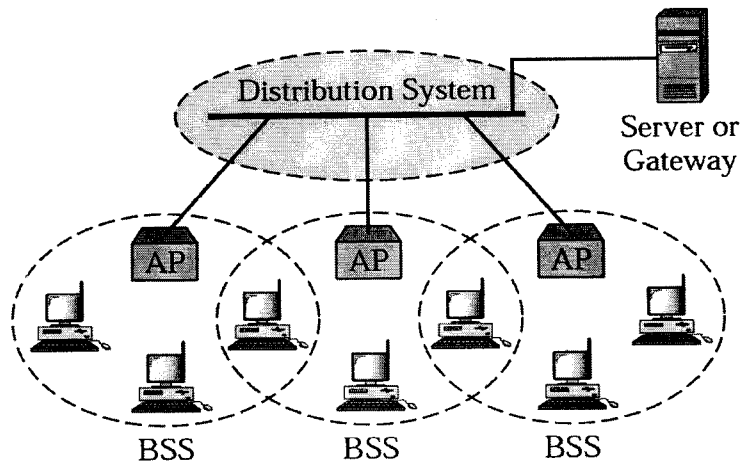
- 6.1 Types of media
- 6.2 Cost

- 6.3 Installation
- 6.4 Capacity
- 6.5 Attenuation
- 6.6 EMI & Noise

Answer

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8.1 The figure below shows a sample wireless network scenario. Each BSS (Basic Service Set) has only one AP (Access Point). The BSSs are connected through “distribution system”, which is usually a wired LAN. (10 Marks)



a. There are 3 types of mobile terminals, describe limitations of each type.

Answer

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b. What is the main function of AP and Distribution System?

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8.2 As we have known that CSMA/CD is used for Wired-line Ethernet, e.g. traditional Ethernet, Fast Ethernet. However, in wireless Ethernet, it uses CSMA/CA. Why does CSMA/CD can not be used in wireless LAN? (10 Marks)

Answer

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9. Answer the following questions: (10 Marks)

Consider asynchronous transmission in the form of 8-bit characters with one start bit and 2 stop bits. For a 20 kbps link, let the sampling instants at the receiver be in the middle of each bit. What is the maximum tolerance of the alignment between the transmitter and receiver clocks for correct reception of character on this line?

