



بسم الله الرحمن الرحيم

(10 points):

Q1-A)

A-True (T) or False (F) (10 points)

1. Switches in a packet-switched network process connection establishment and tear-down messages, whereas switches in a circuit-switched network do not (✓)
2. In ordinary time division multiplexing, the data reaches the output in the same order as they sent but TDM changes the ordering of slots based on the desired connections. (X)
3. Cross bar space division switching involves the sharing of cross points for shorter periods of time (X)
4. In Packet switching operation for External Virtual Circuit, Internal Data Gram Scenario, the network handles each packet separately (✓)
5. ATM switching is a best packet switching for voice and video communication (✓)
6. Memory is required in the space stage of the multistage time switching (✓)
7. In Space division switching, the paths in the circuit are separated from one another spatially (X)
8. Echo in telephone network is the return of talker's voice due to impedance mismatch in the Hybrid circuit. (✓)
9. ISDN is basically the telephone network turned all-digital end to end , using existing switches and wiring of the telephone network (✓)
10. In the subscriber loop design, if you have a 19-gauge cable with optimum loop limit 8Km and a 22-gauge cable with optimum loop limit 6Km, then we should use gauge 22 for a subscriber at a distance 5 Km away from local exchange. (✓)

Q1-B)

(5 points)

What are some differences between circuit switching, datagram packet switching and virtual circuit packet switching?

Q 2-A)

(10 points)

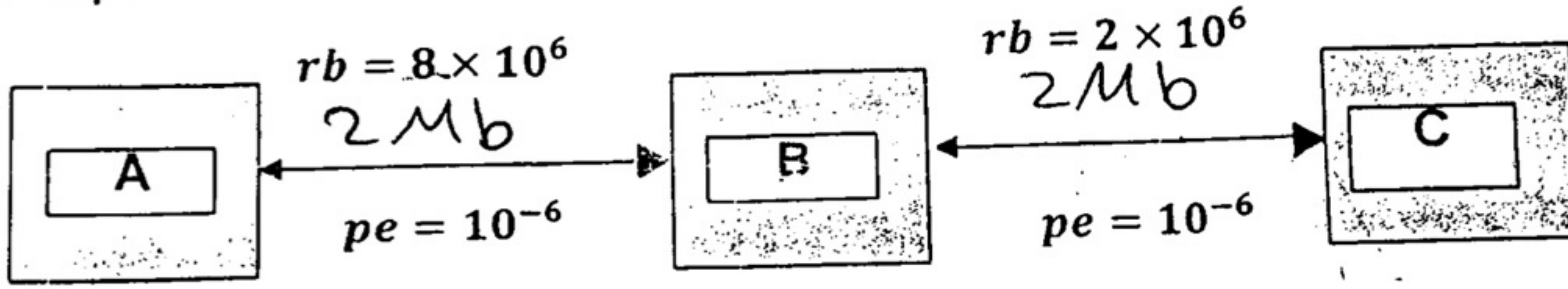
A file of size 2 Mbits is to be transmitted over two links in packet switching network as shown in figure below. If the link speed between A and B is 8Mbps and between B and C is 2Mbps, and the probability of bit errors in both links is 10^{-6} .

(a)- How many bits need to be transmitted to deliver file correctly if the file is sent all at once.

(b)- How many bits need to be transmitted to deliver file correctly if the file is sent as packets of size 500 Kbits.

(c)- Comment on the results of (a) and (b).

(d)- Compare the transmission delay of the above two cases in (a) and (b) → $t_{td} = t_d +$



$$P_c = (1 - (P_e)^{10^6})^{10^6}$$

Q2-B)

(5 points)

What are the various features of CCITT SIGNALLING SYSTEM 7 (SS7)?

Q 3-) Answer the following questions briefly :

(15 points)

a) Determine the implementation complexity of 2048 channel TST switch with 16 TDM links and 128 channels. Let the time slot of space switch is 25. (4 points)

b) Draw the signal exchange diagram for a local call used to represent the sequence of events between the subscriber and exchanges? (4 points)

c) What are the three functional blocks of a conventional time-slot Interchanger (i.e., a time switch), explain with neat diagram? (4 points)

d) Why do we need space stages in Time Switches? (3 points)

Q 4-) Answer the following questions briefly:

(15 points)

a) What are the three basic steps involved in data communication through circuit switching? (3 points)

b) List any four important features of T-S-T (time space time) switching. (4 points)

c) Explain the difference between the basic rate and the primary rate in ISDN, and what is the best application for each one of them? (4 points)

d) How ATM technology supports real time communication? (4 points)

2x96

Instructor : Dr Ali Elghariani

(75 / 75)

EXAM 1 Group B

College of Electronic Technology
Spring 2016

Course: Switching and Networks

Student Name:

Exam duration: 90 min

Part I (25 points):

True (T) or False (F)

- 1- In the telephone set, the mouthpiece is a device that converts acoustic energy to electrical energy (✓)
- 2- In the subscriber loop design, if signaling limit is 8 Km and attenuation limit is 4 Km, then loop limit is 8 km (X)
- 3- Echo is a problem in local telephone calls (X) because it's not big in the local compare with Long Talk
- 4- Off-hook signaling means that no current flow in the subscriber loop (X) flow current
- 5- The number of trunks required to connect 10 switches using mesh network is 45 trunks (✓) $\# = \frac{N(N-1)}{2} = \frac{10 \times 9}{2} = 45$
- 6- If a line to trunk ration is 5:1, this means that the switch is a concentrating switch (✓)
- 7- Tandem switch can be a regional switch (✓)
- 8- Regarding return loss (RL) in the Hybrid circuit, the larger the value of the RL, the better (✓) because it's loss echo
- 9- To provide signaling to the subscriber, Battery is normally provided by the exchange (✓)
- 10- In local telephone network distribution, Local Exchange is connected directly to a distribution tank (✓) $LE \rightarrow RT \rightarrow DB \rightarrow OB$
- 11- Libyan Telephone Network has 2 National Exchanges in Tripoli and Benghazi (✓)
- 12- Four wire connection is usually exist between switches (✓)
- 13- Hybrid circuit in telephone network is used to connect 4-wire with 2-wire networks (✓)
- 14- FEXT cross talk is more annoying than NEXT (X) NEXT Near Far is more annoying than Far End
- 15- In the subscriber loop design, if you have a 19-gauge cable with optimum loop limit 8Km and a 22-gauge cable with optimum loop limit 6Km, then we should use gauge 22 for a subscriber at a distance 5 Km away from local exchange (✓)

(7 1/2)

Answer the following questions briefly :

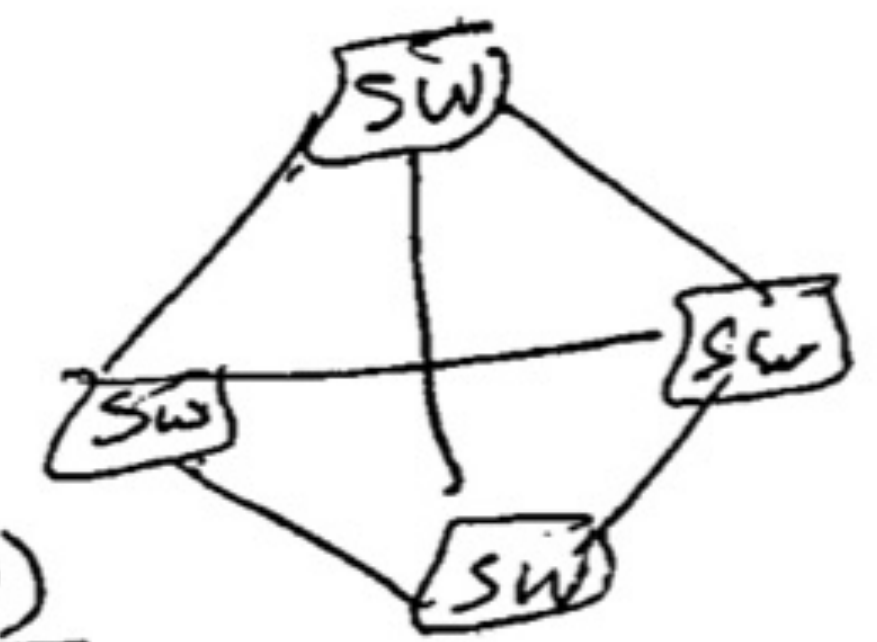
1- Why do we need 4 W connections in telephone network?

- ① to separate in coming traffic from out going traffic, so there's no interference
- ② Because Long distance required repeater and amplifier, * Repeater and Amplifier are uni-direction.



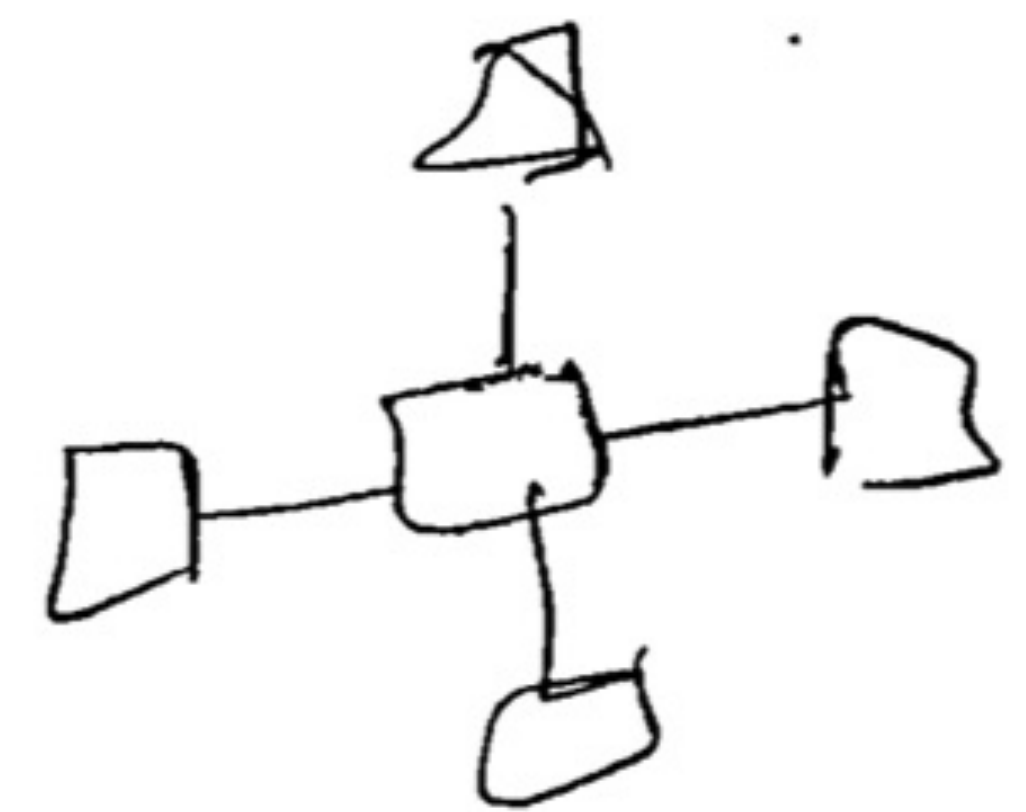
2- In the design of the network configuration between switches, when do you use star topology and when do you use mesh topology?

mesh topology when we have high traffic



$\# \text{trunk} = \frac{N(N-1)}{2}$

star topology when we have low traffic.



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Final EXAM Group B

College of Electronic Technology

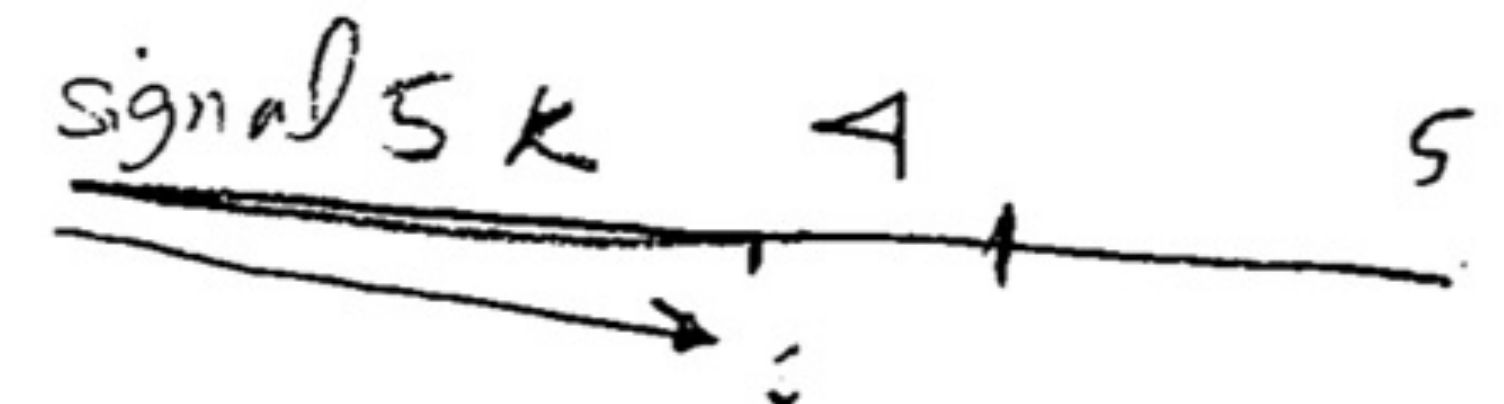
Course: Switching and Networks

Student Name:

Exam duration: 2 Hours

Note: You are allowed to use a half page sheet for mathematical formulas

Part I (20 points):



True (T) or False (F)

- 1- In the subscriber loop design, if signaling limit is 5 Km and attenuation limit is 3 Km, then loop limit is 4 km. (X) *Loop Limit > optimum limit → need extension*
- 2- The number of trunks required to connect 5 switches using mesh network is 45 trunks (X) $N(N-1) = 5(4) = 20$ trunks.
- 3- ADM block in SONET does traffic extraction at some points in the network without demultiplexing the entire traffic (✓)
- 4- Four wire connection is usually exist between switches (✓)
- 5- Hybrid circuit in telephone network is used to connect 4-wire with 2-wire networks (✓)
- 6- ATM switching is a best packet switching for voice and video communication (✓) *support real time*
- 7- In time switching, information between two different time slots is done using TSI (✓) *support channels*
- 8- Memory is required in the space stage of the multistage time switching (✓) *advantages*
- 9- SONET uses the concept of byte multiplexing in all levels (✓) *advantages*
- 10- Best SONET Topology in City area is the ring topology (✓) *Because: survivability and bidirectional traffic*

Answer the following questions briefly :

- 1- What are some differences between circuit switching and packet switching?
- 2- Why do we need space stages in Time Switches?
- 3- Explain the difference between the basic rate and the primary rate in ISDN, and what is the best application for each one of them?
- 4- How ATM technology supports real time communication?
- 5- What is the Echo problem in Telephone network, define it and explain the main performance parameters that you need to consider when studying Echo?

Part II

- Problem 1) (15 points)
- a)- Find the number of channels that can be supported by a single stage time switch if the memory cycle time of this switch is 488.281 nano sec. Calculate the complexity of this switch in terms of number of cross points.
 - b)- Now it is required to expand the size of this time switch using multi-stage configuration (STS) so that the configuration of the first S stage is 4x4 and the second S stage is 4x4. Calculate the switch complexity and what is its blocking probability if the channel utilization is 0.1.
 - c)- If the complexity of the STS is increased to 258.56 due to increasing time stage sub-blocks, find the new blocking probability (everything else stay the same)

$$125 \mu s = 125 \times 10^{-6} \text{ sec} = 128$$

$$C_8 + C_{100} = \frac{1}{100} (8 \times 128) + 128 \log_2 128 = 19.2$$

$$B = 2.5k + (2k) \log_2 k = 2500 + 2000 \log_2 2000 = 2500 + 2000 \times 11 = 22500$$

$$B = [1 - (1 - p)^k] \times k$$

$$B = k \times p \times [1 - (1 - p)^k]$$