

الفصل الدراسي : خريف/...2016..... اسم الأستاذ/المنسق : .....عبدالجواد ابراهيم الطاهر المزوغي .....الزمن 120 دقيقة  
 اسم الطالب : ..... رقم القيد : ..... المجموعة : .....

Q1-A) -(10 points):

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 ( F )
2. In ordinary time division multiplexing, the data reaches the output in the same order as they sent but TSI changes the ordering of slots based on the desired connections. ( T )
3. Cross bar space division switching involves the sharing of cross points for shorter periods of time ( F )
4. In Packet switching operation for External Virtual Circuit, Internal Data Gram Scenario, the network handles each packet separately ( T )
5. ATM switching is a best packet switching for voice and video communication ( T )
6. Memory is required in the space stage of the multistage time switching ( T )
7. In Space division switching, the paths in the circuit are separated from one another spatially ( T )
8. Echo in telephone network is the return of talker's voice due to impedance mismatch in the Hybrid circuit . ( T )
9. ISDN is basically the telephone network turned all-digital end to end , using existing switches and wiring of the telephone network ( T )
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. ( T )

**Q1-B)-(5 points)**

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

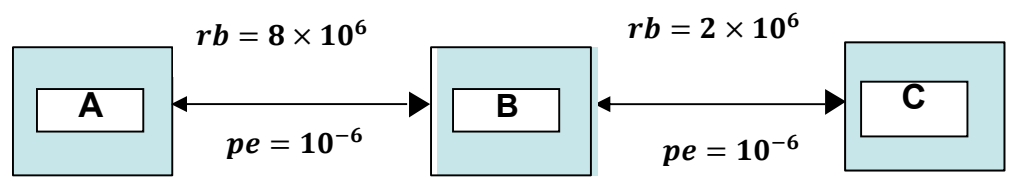
**Answer Q1-B)-(5 points)**

Circuit Switching	Datagram Packet	Virtual Circuit Packet
Dedicated path	No dedicated path	No dedicated path
Path established for entire conversation	Route established for each packet	Route established for entire conversation
Call set up delay	Packet transmission delay	Call set up delay, Packet transmission delay
Overload may block call set up	Overload increases packet delay	Overload may block call set up and increases packet delay
No speed or code conversion	Speed or code conversion	Speed or code conversion
Fixed bandwidth	Dynamic bandwidth	Dynamic bandwidth
No overhead bits after call set up	Overhead bits in each packet	Overhead bits in each packet

**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).



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**Answer Q2-A:-**

a) ( 3 points)

Packet has  $2 \times 10^6$  bits

$$P_{correct} = (1 - P_e)^{2 \times 10^6} = 0.135$$

Number of bits to be transmitted to deliver file correctly =  $\frac{1}{0.135} \times 2 \times 2 \times 10^6 = 29.55$  Mbits

b) (2 points )

$$P_{correct} = (1 - P_e)^{500000} = 0.666$$

Number of bits to be transmitted to deliver file correctly =  $\frac{1}{0.666} \times 2 \times 2 \times 10^6$   
= 6.59 Mbits

C) ( 2 points)

This shows the importance of Packetization , the smaller the packet size, the less number of bits needs to be transmitted to get file send correctly.

c) (3 points)

$$t_{transmission} = \frac{\text{packet length}}{rb} \times \text{number of bops}$$

$$\text{For case ( a) } t_{transmission} = \frac{2 \times 10^6}{8 \times 10^6} + \frac{2 \times 10^6}{2 \times 10^6} = 1.25 \text{ sec}$$

$$\text{For case (b) } t_{transmission} = \frac{500 \times 10^3}{8 \times 10^6} + \frac{500 \times 10^3}{2 \times 10^6} = 0.3125 \text{ sec}$$

**Q2-B)-( 5 points)**

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

**Answer Q2-B)-( 5 points)**

1. Internationally standardized by the ITU.
2. SS7 is suitable for any transmission medium *i.e.*, can be operated over both terrestrial and satellite links.
3. Even though SS7 is optimized to work with digital SPC exchanges utilizing 64 kbps digital channels, it is suitable for operation over analog channels.
4. SS7 is suitable for various communication services such as telephony, text, data, images and video.
5. Transport mechanism is application independent.

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Q 3-A) (4 points)

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.

Answer Q 3-A) ( 4 points)

$$IC = N^2 + \frac{NL \log_2 N + 2NT(8) + 2NL \log_2 T}{100}$$

Sol. Given  $N = 16$

$T = 128$

$L = 25$

$$IC = 16^2 + \frac{16 \times 25 \times \log_2 16 + 2 \times 16 \times 128 \times 8 + 2 \times 16 \times 25 \times \log_2 128}{100}$$

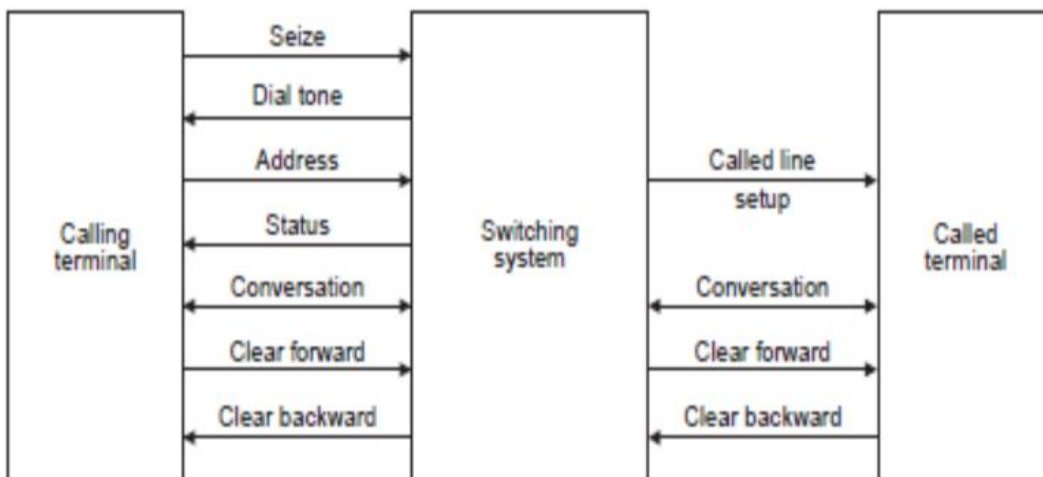
$IC = 656$  cross points.

Q 3-B) (4 points)

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

Answer Q 3-B) (4 points)

Answer



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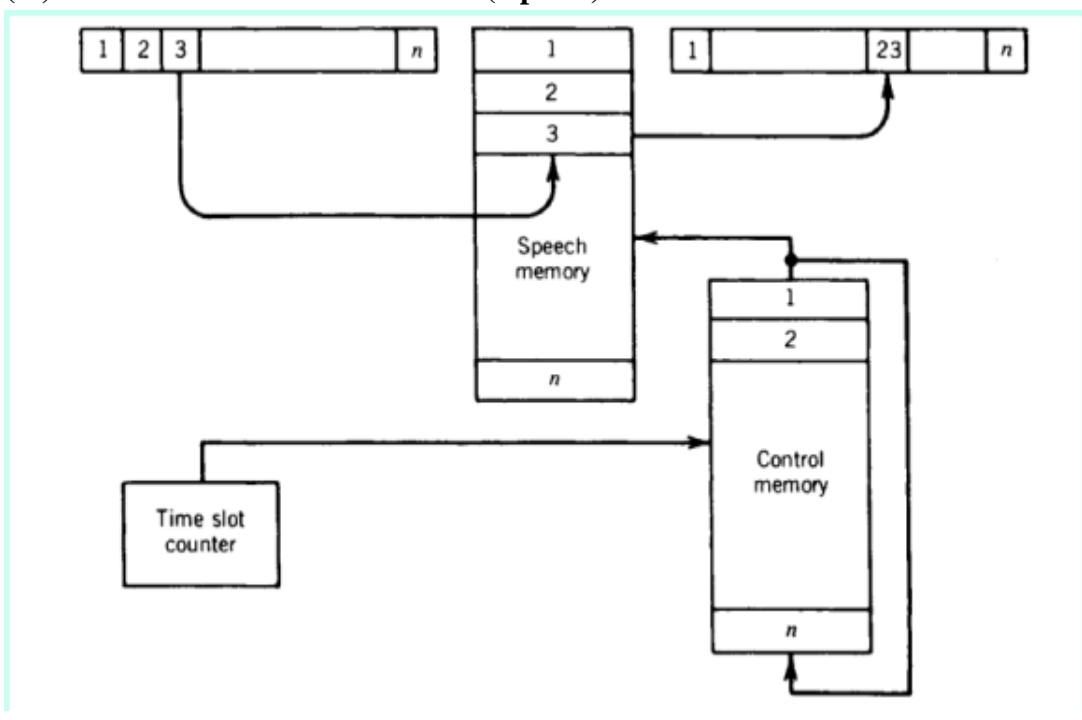
**Q 3-C) (4 points)**

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

**Answer Q 3-C) ( 4 points)**

The three functional blocks are:

- (i)- Speech memory (1 point)
- (ii) Control memory (1 point)
- (iii) Time slot counter (1 point)



(1point)

**Q 3-D) (3 points)**

Why do we need space stages in Time Switches?

**Answer Q 3-D) (3 points)**

Due to limitations of memory speed in Time switching, so the space stages are added to increase capacity (size) of time switch.

**Q 4-A) (3 points)**

**What are the three basic steps involved in data communication through circuit switching?**

**Answer Q 4-A) (3 points)**

The steps are:

- i) Circuit establishment (before data transfer)
- ii) Circuit maintenance (When data transfer is going on)
- iii) Circuit disconnect (When data transfer is over)

**Q 4-B) (4 points)**

**List any four important features of T-S-T (time space time) switching.**

**Answer Q 4-B) (4 points)**

Some important features of TST switches are:

(i) **Low blocking probability.** An incoming channel time slot may be connected to an outgoing channel time slot using any possible space array time slot. Thus there are many alternative paths between two subscribers.

This concept reduces the blocking probability of a three stage combination switch.

(ii) **Stage independency.** The space stage operates in a time-divided fashion, independently of the external TDM links. The number of space stage time slots L does not coincide with the number of external TDM time slots T.

(iii) **Implementation advantage.** The factors to be considered for switching design and implementation are traffic loads, modularity, testability, expandability and simple control requirements. For large switches with heavy traffic loads, the TST have good implementation advantage.

(iv) **More cost effective.** If the input channel loading is high, the time expansion of TST and space expansion of STS are required.

Time expansion of TST can be achieved at less cost than space expansion of STS

**Q 4-C) (4 points)**

**Explain the difference between the basic rate and the primary rate in ISDN, and what is the best application for each one of them?**

**Answer Q 4-C) (4 points)**

The difference is

- Basic rate of ISDN=2B+D = 2x(64 kbps)+ 16 kbps= 144 kbps

It is suitable for home use.

- Primary Rate = 30B +D= 30 x 64kbps + 64kbps or 23B+D, It is suitable for big businesses use .

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Q 4-D) ( 4points)

How ATM technology supports real time communication?

Answer Q 4-D) (4 points)

By considering fixed small packet size and high speed switch, it yields small packet delay and if any packet is lost, it will not affect much the quality of voice.