

Part B (Total this part 23 Points)

1- Choose only one answer for each of the following questions. Put your choice in the given table. A correct answer score is one point. A wrong answer earns (-0.25) point. Total this part 10 points

1- In circuit switching (e.g., telephone network);

- ☒ a- Dedicated communications path between the source and destination is established,
- b- Message is digitized and broken into a series of packets
- c- Each intermediate node determines next leg of transmission for the rest of the conversation or message.
- d- None of the above.

2- To enable automatic switching, the telephone system must feature some essential components such as :

- ☒ a- Addressing, communications between a subscriber and a switch, and between switches.
- b- Channel multiplexing
- c- Call hubs
- d- location of existing exchanges and extension of serving areas

3- Signaling functions do not include:

- a- Passing the call information to appropriate switches,
- b- Telling users about call status,
- ☒ c- Multiplexing telephone channels on different links
- d- Supervising call set up

4- In-band signaling uses

- ☒ a- the same voice channel to perform message exchanges between two devices.
- b- Uses a separate channel for the exchange of signaling information.
- c- Uses tones that do not interfere with telephone conversation.
- d- Carrier system to transmit signaling information.

5- When a subscriber goes off-hook, its exchange will send a dial tone after,

- ☒ a- Allocation of storage for address digits and connection of common equipment
- b- Switching-path set-up and continuity check
- c- Sending a notification to called subscriber
- d- None of the above

يستثنى من هذه الأسئلة  
التي يسبقها علامة  
أو التي يسبقها علامة  
أيضا  
لازم يحكم مقلد

الراد انت فكري

يعني تطلع بلاش  
لو 1 رقم قبل القسمة على 2  
عاشق بالخط

نصيحته  
من  
افتن

لو ما عرفت  
اي حاجة  
أوعس نسيها حاجة

لوري لو عملت  
القسمة للقيم عشوائي  
من المتوسط عاشق

يعني  
C = 1/2

يقول نقل  
التعليق  
تا قدر در الحبيب

والتمانية  
أيا قيسه بغيرك



2 hours, 12 pages, 2 parts

- 6- A full duplex connection between two TDM channel (X) and channel (Y) using a T-switch in a structure using sequential-in random-out, implies that :
- a- data stored at address (x) is read randomly.
  - b- data stored at address (x) is read during outgoing time slot (x).
  - c- data stored at address (x) is read during outgoing time slot (y).
  - d- data stored at address (y) is read during outgoing time slot (x).
- 7- Circuit switching can be inefficient because:
- a- Channel capacity dedicated for duration of connection
  - b- Utilization not 100%
  - c- Delay prior to signal transfer for establishment
  - ☒ d- All of the above
- 8- The maximum bit rate that can be transmitted over the telephone channel depends on,
- a- Channel bandwidth,
  - b- Transmitting power,
  - c- Signal to noise ratio,
  - ☒ d- "a" and "c" above
- 9- Which of the followings is not an issue that must be considered in the design of a local area network;
- a- number of inhabitants and telephone density
  - ☒ b- switching architecture and technology (e.g., S or T, or TST,...)
  - c- location of existing exchanges and extension of serving areas
  - d- geographic extension of local area of interest.
- 10- In the design of three stage switching, the condition for non-blocking structure is that the number of intermediate stage switches is nearly equal to:
- a- The number of first stage switches,
  - ☒ b- twice the number of first stage switches,
  - c- Three times the number of first stage switches,
  - d- Four times the number of first stage switches.



2 hours, 12 pages, 2 parts

II - In a three-stage switching matrix, the total number of inlets (N) is 2048, the size of each inlet/outlet group (n) is 32. It is required to keep the blocking probability as small as 0.002. Find the number of intermediate switches (k) that can achieve such probability assuming inlet utilization, p, of 0.7. (5 points)

$$N = 2048$$

$$n = 32$$

$$B = 0.002$$

$$k ??$$

$$p = 0.7$$

$$B = \left( 1 - \left( 1 - \frac{p}{\beta} \right)^2 \right)^k$$

$$\beta = \frac{k}{n}$$

$$B = \left( 1 - \left( 1 - \frac{32 \cdot 0.7}{k} \right)^2 \right)^k$$

$$B = 0.002 \quad \leftarrow \quad k = 10$$



I swear it comes  
from the first try



III- A central office to a PBX trunk group contains "n" circuits, assume 12 erlangs of traffic with 5 minutes average holding time, determine the followings:

- Call rate,
- Number of trunk circuits required to achieve Blocking probability less or equal to 0.5 %. Comment on your results.
- Find how much traffic is carried by the first circuit? (4 Points)

$$A = 12 \text{ Erlangs}$$

$$t_m = 5 \cdot 60 \text{ sec}$$

$$A = \lambda \cdot t_m$$

$$12 = 5 \cdot 60 \cdot \lambda$$

call rate

$$\lambda = 0.04 \text{ call/sec}$$

$$B = 0.5 \% \quad A = 12$$

Supposed from the table  $N = 22$

will give  
 $B > 0.5\%$   
although it  
is very near to 12

as

19	→	10.3
20	→	11.1
21	→	11.9
22	→	12.7

doesn't exist  
in the table

Comment: کوئی ... نہیں ملتا ...



IV - Two local exchanges, directly connected, experience a traffic of 4 calls per minutes. The link between the two local exchanges provides 25 direct links between the two exchanges. If the average holding time is 5 minutes, find the probability of blocking. How much traffic overflows to a tandem exchange. (4 points)

$$\lambda = 4 \text{ calls/min} = \frac{4}{60} \text{ calls/sec}$$

$$N = 25 \quad t_m = 5 \cdot 60 \text{ sec}$$

$$A = \lambda t_m = \frac{4}{60} \cdot 5 \cdot 60 = 20 \text{ Erlang}$$

from the table (doesn't exist with me)  
the part  $N=25$

How much traffic?

$$\boxed{B = A} \text{ Erlang}$$