


<p>University : Menoufia Faculty : Electronic Engineering Department : Electronics and Electrical Comm. Academic level : 3rd Year Course Name : Digital Exchange (selected topic) Course Code : ECE 315</p>		<p>Date : 22/01/2020 Time : 3 Hour No. of pages : 3 Full Mark : 70 Marks Exam : Final Exam Examiner : Dr: Saied M. Abd El-atty</p>
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Answer the following questions

Question 1: (15M)

- Describe the PSTN structure with defining designation exchange. Draw the local network and exchange area network in the PSTN. (3M)
- What are the forms of signaling? Classify the signaling techniques. State the drawbacks of the in-band signaling in PSTN. (5M)
- Consider a telephone switched board with 150 phones. Assuming the number of call is 2/hour/line, the average call duration is 4 minutes, and 58 % of all calls are made external via a T-1 trunk (24 channels) to the PSTN. Determine blocking probability, carried traffic and channel utilization. (5M)

Question 2: (10M)

- Describe ISDN and identify its channels. (5M)
- Explain the operation of cross bar switch and how it can be used in multiple stage switching. (3M)
- State the key characteristics of routing algorithms. (2M)

Question 3: (10M)

- Distinguish among circuit, message and packet switching techniques. State the advantage and disadvantage, and draw the time event of each technique. (3M)
- A message with length 1000 byte is transferred through a switching network with 3 nodes between the source and the destination. The data rate on all links is 100kbs with packet size 800 bit and 20 bits as a header. The set up time is 0.25s, with processing time at each node is 0.015s, and while the average queuing delay at each node are 0.1s. The propagation speed over any link is 300 m/ μ s with 150km distance between each two nodes. **Determine the end-to-end delay time and throughput** for: (7M)



P.T.O (انظر الي خلف الورقة)

1-Circuit switching

2- Datagram switching (pipelining)

Comment your results

Question 4: Choose three (3) points ONLY to answer (5M for each point=15M)

- a- Define SS7 signaling technique and state its merits. Draw a simplified SS7 network, indicating the types of links.
- b- What is a virtual private network (VPN)? How does a VPN work?
- c- Describe digital subscriber line (DSL) technology. What are their types? Draw the figure that shows ADSL allows the subscriber to use the voice channel and the data channel at the same time.
- d- Consider a hexagonal cellular mobile radio system. Each cell has a radius of 5 km and the call rate per user is 0.5 call/h with call duration equals 1.5mins. The user population is 20 users/km². If the allocated channels per cell is 21; determine the blocking probability and channel utilization.

Question 5: Choose Four (4) points ONLY to answer (5M for each point=20M)

- 1) What is IP Multimedia Subsystem (IMS), Fixed and Mobile Convergence, IMS transit? Use figures to explain.
- 2) Describe the IMS network architecture, state briefly the function of each element.
- 3) How can PSTN make Call Set Up procedure by using SS7? Use figures to explain
- 4) Explain Database Query in SS7 network. Use figures to explain.
- 5) Clarify with the help of figure the SS7 protocol stack layers.
- 6) Discuss briefly the addressing and signaling units in SS7 network.

Best wishes
Dr. Saied. M. Abd El-atty