



**The University of Jordan
Computer Engineering Department
CPE 0907422 – Computer Networks
Midterm Exam
Summer 2009**

يوم ووقت المحاضرة: ٤:٤٠ - ١:٤٠

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Read the following items carefully:

- The exam time is 60 minutes
- Maximum score is 30 points
- No calculators are permitted
- No questions
- Closed books and notes
- Answer all questions
- Write only in ink

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Q. #1 (5 points). What are the basic characteristics of TCP versus UDP transport-layer protocols.

TCP: (1). ~~connection oriented~~ (2). ~~reliable~~ (3). ~~error-detection~~
(4). ~~flow-control~~ (5). ~~congestion-control~~ (6). ~~stateless~~ stateless

UDP: (1). ~~connectionless~~ (2). ~~unreliable~~ (3). ~~error-detection~~
(4). ~~stateless~~

Q. #2 (2 points). In computer networking, state four radio link types.

(1). WiFi (2). ~~WiMax~~ ^{WiMax} (3). HSPA
(4). EVDO

Q. #3 (3 points). Network edge consists of ~~residential network~~ ^{Residential} and ~~company network~~ ^{company} and ~~wireless network~~ while network core consists of ~~routers~~ and ~~switches~~ and ~~servers~~.

Q. #4 (1 point). Nodal delay is: $d_{\text{nodal}} = d_{\text{Transport}} + d_{\text{Propagation}} + d_{\text{Queue}} + d_{\text{Processing}}$

Q. #5 (1 point). In words, computer network traffic intensity is:

$$\text{Traffic Intensity} = (\text{Packet length}) * (\text{Packet arrival rate}) / (\text{Transmission rate})$$

~~LAN~~

5.15

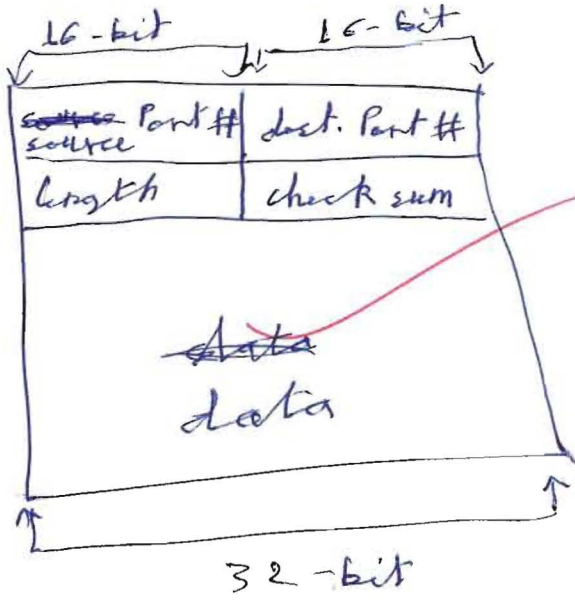
Q. #6 (6 points). Fill in the following table with the application-layer protocols and transport-layer protocols for the corresponding computer network applications.

<u>Application</u>	<u>Application-layer protocol</u>	<u>transport-layer protocol</u>
E-mail	SMTP ✓	TCP ✓
Remote Terminal Access	Telnet ✓	TCP ✓
Web	HTTP ✓	TCP ✓
File Transfer	FTP ✓	TCP ✓
Streaming Multimedia	HTTP, RTP	TCP or UDP
Internet Telephony	RTP, SIP, Proprietary (SIP)	UDP

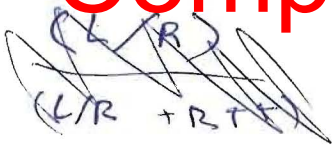
Q. #7 (1 point). HTTP can be Persistent or Non-Persistent (1)

Q. #8 (1 point). Web cache is also known as Proxy server ~~server~~ (1)

Q. #9 (1 point). Draw the complete structure of the UDP segment format with the corresponding fields' names and lengths.



(1)



Q. #10 (2 points). In words, non-pipelined computer network utilization is:

$$\text{Utilization} = \left(\frac{\text{Packet length}}{\text{transmission rate}} \right) / \left[\left(\frac{\text{Round Trip time}}{\text{time}} \right) + \left(\frac{\text{Packet length}}{\text{transmission rate}} \right) \right]$$

And the pipelined computer network utilization is:

$$\text{Utilization} = \left(\frac{\text{number of packets in flight}}{\text{of}} \right) * \left(\frac{\text{Packet length}}{\text{transmission rate}} \right) / \left[\left(\frac{\text{Round Trip time}}{\text{time}} \right) + \left(\frac{\text{Packet length}}{\text{transmission rate}} \right) \right]$$

Q. #11 (3 points). In words, in a computer network: RTT: round Trip Time

$$\text{TimeoutInterval} = \left(\frac{\text{estimated}}{\text{Estimated}} \text{RTT} \right) + (4) * (\text{DevRTT})$$

$$\text{DevRTT} = (1 - \beta) * (\text{DevRTT}) + (\beta) * |\text{estimated RTT} - \text{sample RTT}|$$

$$\text{EstimatedRTT} = (1 - \alpha) * \left(\frac{\text{estimated}}{\text{RTT}} \right) + (\alpha) * (\text{sample RTT})$$

Q. #12 (4 points). In reliable data transfer, the protocol is either ~~stop-and-wait~~ ~~stop-and-wait~~

or Pipe lined, and the pipelined protocol is either ~~selective repeats~~

or go-back-n ~~selective repeats~~ ~~repeats~~ repeats

