Computer Communication & Networks   **Total Marks: 80**
Summer Final Exam

<mark>**For Students who have missed Midterm Exam**</mark>

- **Only handwritten** answers accepted (Paper typed in Word Format will not be marked)
- Write your **ID on every page** of answer sheets
- Write Question No., Part No., Question and then start answer e.g. Q1 (a) Which layers…
- Before submitting check your Document file is arranged sequentially e.g. Page No. 1, 2, 3, 4…
- Submit your answers in PDF format. Your file name will be your ID_Student name. e.g. 12345_IrfanUllah.pdf

Q1.		**Describe briefly**	20 marks
	a.	Define Data Communication and name its components?	
	b.	Define Networks, what are the types of connections?	
	c.	What is the difference between half-duplex and full-duplex transmission modes?	
	d.	Why are protocols needed?	
	e.	An IP packet has arrived with the first 8 bits 01000010. The receiver discards the packet. Why?	
	f.	A packet has arrived in which the offset value is 100, the value of HLEN is 5 and the value of the total length field is 100. What is the number of the first byte and the last byte?	
	g.	A network on the Internet has a subnet mask of 255.255.240.0. What is the maximum number of hosts it can handle?	
	h.	You have just explained the ARP protocol to a friend. When you are all done, he says: "I've got it. ARP provides a service to the network layer, so it is part of the data link layer." What do you say to him?	
	i.	Which subnet does host 10.48.107.16 with mask 255.255.240.0 belong to?	
Q2.	a.	What are the responsibilities of Data Link Layer?	20 marks
	b.	What are the station types supported by HDLC? Also Describe briefly HDLC frames.	
	c.	**Draw** the scenario of Stop-and-Wait Automatic Repeat Request. Frame 0 is sent and acknowledged. Frame 1 is lost and resent after the time-out. The resent frame 1 is acknowledged and the timer stops. Frame 0 is sent and acknowledged, but the acknowledgment is lost. The sender has no idea if the frame or the acknowledgment is lost, so after the time-out, it resends frame 0, which is acknowledged. The data packets is show below 0 | 1 | 0 | 1 | 0 | 1	
Q3.	a.	Define switch and describe the need for switching.	15 marks
	b.	We need a three-stage space-division switch with N =200. We use 20 crossbars at the first and third stages and 4 crossbars at the middle stage. Draw the configuration diagram. Calculate the total number of cross points. Calculate the total number of cross points using Clos Criteria.	

Q4.	a.	What is difference between analog and digital signal. Name and explain the parameters that characterizes an analog signal with the help of figure.	10 marks
	b.	A digitized voice channel is made by digitizing a 4-kHz bandwidth analog voice signal. We need to sample the signal at twice the highest frequency. We assume that each sample requires 16 bits. What is the required bit rate?	
Q5.	a.	Four types of addresses are used in internet. Name and explain w.r.t their layers. Also mention what is the role of addressing in delivery of packets from one sender to another?	15 marks
	b.	Below shows a part of an internet with two routers connecting three LANs. Each device (computer or router) has a pair of addresses (logical and physical) for each connection. Each router, however, is connected to three networks (only two are shown in the figure). So each router has three pairs of addresses, one for each connection. Using the figure below fill in the missing information.	