**Ryan Section:**

**10 marks: multiple choice**

**10 marks: one page of fill in the blanks**

**5 marks each: short answers 4 questions(chose 2 to answer)**

**10 marks each: only one long answer**

**1 double sided handwritten cheat sheet**

**topics from the second half**

**- switches**

**- hackers**

**- writing mobile apps**

**- security applications**

**- network failures(reasons)**

**He said, don't write essays!**

**Lecture#1 Standard Organization**

* Understand how UTF-8 encoding works. Given you a character and you need to convert it to UTF-8 encoding.
* Understand the following standard organizations work and able to give example of their standard:
  + ITU
  + IETF
  + IEEE
* Identify the TCP/IP model and OSI model difference

**Lecture#2 Physical Layer**

* What is the PDU?
* What is the overhead or address on this layer?
* Give three examples of the protocol in this layer
* What are the functions of physical Layer?
* What are the three attributes of signals? Are you able to describe them?
* What are the two types of signals and their characteristics?
* Do you know how to use NRZI for transmission a string of 1 and 0?
* Baud rate = signal change per second
* Bit rate = how many bits are sent per second
* How you can increase the bit rate but keep the frequency the same?
* How to transmit more bits?
* Identify the cables STP/UTP/Coaxial /Fibers and understand their difference in transmission distance
* Identify the difference between SM fiber and MM fiber
* Three ways to obtain Internet services at home:
  + DSL
  + Cable (DOCSIS)
  + Fiber (FTTH)

**Lecture #3 Data Link Layer**

* What is the PDU?
* What is the overhead or address on this layer?
* Give three examples of the protocol in this layer
* What are the functions of Data Link Layer?
* What are the synchronization transmission and its problem and solution? Advantage?
* What are the asynchronization transmission and its problem? Advantage?
* What is bit stuffing? Can you able to apply it when provides with a string of “1” and “0”?
* What is simplex? Half duplex? Full duplex? Can you give two examples of each type of data flow?
* What are the common ways to do error control and error correction?

**Lecture#4 Network/Internet Layer**

* What is the PDU?
* What is the overhead or address on this layer?
* Give three examples of the protocol in this layer
* What are the functions of network Layer?
* What are classful address and its problem?
* What is classless address?
* Can you able to identify classful and classless address?
* Can you able to identify the private IPv4 address?
* What are the ranges of private IPv4 addresses?
* What is the class of multicast addresses? Can you list the range of multicast addresses?
* How many bits of IPv4 and IPv6?
* Do you know how to perform zero suppression for IPv6 address?
* What is broadcast address? Can you give an example?
* Identify the special addresses:
  + 0.0.0.0
  + 255.255.255.255
  + 169.254.xx.xx
  + 127.0.0.1
* Broadcast does not exist in IPv6 and so do private address
* What is dual environment?

**Lecture#5 Switching and Routing**

* IEEE 802.3 is the Ethernet standard
* IEEE 802.3 has divided data link layer into Logical link layer and media access layer
* What is the collision avoiding method used in the wireless network? How it works?
* What are the difference between circuit switching and packet switching? Which one is used for today’s modern networking and why?
* What are the two tables in the router?
* How the router makes decision to select the best path?
* What is MPLS? Which layer it belongs to?
* What are the two standards used for the VoIP? Which one is more popular today? VoIP uses client /server architecture. Built-in CODECS to convert digital IP packet to analog voice

**Lecture#6 Wired and Wireless**

* IEEE 802.11 is the wireless Ethernet standard
* Why is aggregated speed for the switch?
* What are the two types of switches? What are the differences between them? Which one has CRC? What are the advantages and disadvantages of them?
* What is RSTP? Why it allows the network to provide redundancy?
* 802.1x port authentication. How does it work?
* What is MAC spoofing? What is Evil Twin and MITM attack?
* What is WEP? WPA? WPA is backward compatible of WEP but not WPA2
* WPA2 has two modes of operation. What are those two modes? Which mode works with 802.1x to provide secure authentication and transmission?
* Wireless signal has greater attenuation than copper or fiber optics. Why?
* Wireless frame has three MAC addresses. They are MAC of sender, MAC of AP and MAC of next Wi-Fi device. Wired Ethernet frame has only two MAC address. They are source MAC and destination MAC
* What are the difference between rough access point and evil twin?
* What is the full name of VPN and why we use VPN? What makes the VPN secure?

**Lecture#7 Network Management and Security**

* Which tool is to use as the creation of network simulations? Which table is used to decide which product to buy?
* What is SLA? Common types of SLA: Speed, latency, and availability. Failure to meet the SLA will result in penalty
* What are the four major reasons for network failure?
* Poor Assumption: what is the purpose of creating a choke point in the application? What are the best practices to override poor assumption?
* What is the software used to break in a network based on its vulnerability?
* What are the best practices on hardening servers?
* Poor Policy guidelines: What are the best practices?
* Every change in an alphanumeric password increases the complexity exponentially by how many times?
* What is DMZ?
* What are the three steps of security management?
* List ways to defense the network
* Why hacker hacks the network? What are the motivation and methodology?
* List some types of individual hacking
* List the stages of corp. level hacking and what is involved in each stage.
* What is DDoS attack?
* What is smurf attack?

**Lecture#8 Application Security**

* What is SQL injection attack?
* What is Cross-Site Attack (XSS)?
* What are the actions to take for preventing web vulnerabilities?
* What is a typical SDLC process and why it costs security issue for software?
* What is the framework for software development to build secure software? Describe each phase in detail
* What are the ten best practices for building secure mobile software?

**Lecture#9 IoT**

* What is IoT? Give examples in terms of product and application.
* What are good and bad for electronic communication?
* What are the three laws of Robotics?
* What are the three stumbling blocks preventing the IoT?
* Name some IoT platforms and the top six programming language for IoT. Describe each of the programming language