



UNIVERSITY OF RUHUNA

Faculty of Engineering

End-Semester 5 Examination in Engineering: August 2018

Module Number: EE5302

Module Name: Computer Networks

[Three Hours]

[Answer all questions, each question carries ten marks]

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- Q1 a) i) What are the main differences between the client-server and peer-to-peer networking?
ii) Explain the advantages and disadvantages of peer-to-peer model over the client-server model. [2.0 Marks]
- b) A system has an n-layer protocol hierarchy. An application generates messages of length M bytes. At each of the layers, an h-byte header is added. Determine the fraction of the network bandwidth filled with headers. [2.0 Marks]
- c) Briefly describe the difference between "Physical Topology" and "Logical Topology" under computer network scenario. [2.0 Marks]
- d) i) Compared with Unshielded Twisted Pair (UTP) cables, what are the advantages of optical fiber cables?
ii) Optical fiber cables are preferred than UTP in inter building connectivity even for shorter distances. What is the main reason for it? [2.0 Marks]
- e) A host on a LAN wishes to send the following bit stream: 0100110001101. Sketch the bit stream with following encoding methods.
i) Nonreturn to Zero-Level (NRZ-L)
ii) Nonreturn to Zero Inverted (NRZI) [2.0 Marks]
- Q2 a) Briefly explain the media access control technology of "Carrier-Sense Multiple Access with Collision Detection" (CSMA/CD) used in Ethernet. [2.0 Marks]
- b) In wireless LAN, "Carrier-Sense Multiple Access with Collision Avoidance" (CSMA/CA) is used in media access controlling. What is the main reason that, CSMA/CD method is not deployed in wireless LANs ? [1.0 Mark]
- c) i) What is a VLAN?
ii) Explain two main advantages of VLANs. [2.0 Marks]

d) Briefly explain VLAN Access (Un-tagged) Ports and VLAN Trunk (Tagged) Ports and their usage, with a sample network diagram.

[2.0 Marks]

e) Briefly describe Stop-and-Wait ARQ, Go-Back-N ARQ and Selective-Reject ARQ error correction (error control) mechanisms that are used in Computer Networking.

[3.0 Marks]

Q3 a) Describe Public and Private IPs and list down the private IP ranges in Class A, Class B and Class C.

[2.0 Marks]

b) In computer Networking, there are two IP versions as IPv4 and IPv6.

i) Explain the requirement to have the latest version IPv6 overcoming the issues in IPv4.

ii) Explain three techniques that are used in transitioning from IPv4 to IPv6.

[2.0 Marks]

c) Describe two routing loop prevention mechanisms that can be used in Routing Information Protocol (RIP) using a suitable example.

[2.0 Marks]

d) An organization has configured its network with both Open Shortest Path First (OSPF) and RIP routing protocols. One router has learned two separate paths from OSPF and RIP for a single destination. Assume all the configuration parameters are set to default values.

i) Which path the router will choose to forward packets to that particular destination?

ii) Explain, why router chose that path.

[2.0 Marks]

e) An organization has a couple of branches and a head office. All the branches should access the internet through head office router. You are given the task to configure routing in one of the branch. The interface in your branch router has been configured with the IP address of 16.32.96.109/30 to connect with the head office router.

i) What route needs to be configured in your branch router to access the internet and what is the IP of next hop?

ii) If the router is a Cisco Router, what is the command you should type to configure above route?

[2.0 Marks]

Q4 a) i) How User Datagram Protocol (UDP) is different from Transmission Control Protocol (TCP)?

ii) State two user cases where UDP is used and explain why TCP is not used instead of UDP.

[3.0 Marks]

b) Draw the Headers of TCP and UDP and explain the difference between the properties of header fields in both protocols.

[2.0 Marks]

- c) Explain 3-way handshaking using a suitable diagram. [2.0 Marks]
- d) What is the purpose of TCP/UDP port Numbers? [1.0 Mark]
- e) State TCP/UDP port numbers of five well-known applications. [1.0 Mark]
- f) What are the factors need to be considered in reliable communication? [1.0 Mark]

Q5 a) i) What are the main differences between Internet Message Access Protocol (IMAP) and Post Office Protocol 3 (POP3)?
ii) Describe the three phases of POP3 protocol runs through while accessing e-mails. [2.0 Marks]

b) i) Explain the requirement of the Domain Name System (DNS) service.
ii) Describe Distributed and Hierarchical Database used in DNS and explain why the database is used in Distributed and Hierarchical manner rather than using a flat database. [2.0 Marks]

c) i) Briefly describe the services provided by a Dynamic Host Configuration Protocol (DHCP) server.
ii) "DHCP Discovery" message is a broadcast message sent by the client to find a DHCP server. Once it is received by the DHCP server, it responds with "DHCP Offer" message to the client as a broadcast message. Explain why "DHCP Offer" message is sent as a broadcast message rather than a unicast message. [2.0 Marks]

d) What is the purpose of certification authority? Explain with an example. [2.0 Marks]

e) Explain public key encryption mechanism using a suitable diagram. What is the main advantage of public key encryption compared with symmetric key encryption? [2.0 Marks]