

THE COPPERBELT UNIVERSITY

COMPUTER SCIENCE DEPARTMENT

Internet Technologies Test Two

Time allowed 2 hrs

Answer all questions

All questions have equal marks

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Question One

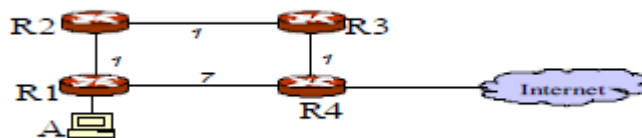
- Is TCP checksum necessary or could TCP allow IP to checksum the data. (5 marks)
- Explain Three-Way Handshake Mechanism used by TCP to terminate a Session reliably. (5 marks)

Question Two

- Why does IPV6 use separate extension headers? Explain (5 marks)
- Assume a new link layer, called dream-net, with MTU 1400 bytes and a UDP datagram with 4096 bytes of user data. There are no IP options involved. How many IP fragments are transmitted and what is the offset and IP payload length of each fragment? (5 marks)

Question Three

- Regard the network below, where a host A, is connected to the Internet via a routed network consisting of four routers R1 - R4. A is directly connected to R1. Think of the high-metric link R1-R4 as a backup low-bandwidth connection. The routers run the RIP distance- vector protocol, and their periodic update timers are set to 30 seconds, that is, the period of their sending route responses to each other. The metrics of the links are seen in the figure. Assume that the network interface card connecting R1 directly to R2 breaks. In this scenario, functions like poison-reverse, triggered updates, etcetera are not available in the routers.



- Explain how the count-to-infinity problem can occur in this network with respect to A? How is A affected? (2 marks)
- If the count-to-infinity occurs, how long does it take before A can communicate with the Internet again? Motivate your answer. (3 marks)

- b) Does an Exterior Router use EGP to exchange reachability information with interior routers? Why is the IP source network specified in an EGP routing update message? (5 marks)

Question Four

An ISP is granted a block of addresses starting with 190.100.0.0/16. The ISP needs to distribute these addresses to three groups of customers as follows:

1. The first group has 64 customers; each needs 256 addresses.
2. The second group has 128 customers; each needs 128 addresses.
3. The third group has 128 customers; each needs 64 addresses.

Design the subblocks and give the slash notation for each subblock. Find out how many addresses are still available after these allocations. (10 marks)

Question Five

- a) The paradigm for client server arranges one application program to wait for another application to initiate communication and then the server responds when the request is processed. Briefly discuss this paradigm in terms of the interaction and characteristics of the communicating components. (4 marks)
- b) ICMP (Internet Control Message Protocol) is an error-reporting protocol network devices like routers use to generate error messages to the source IP address when network problems prevent delivery of IP packets. Explain the scenarios when no ICMP error message will be generated. (4 marks)
- c) The Internet Group Management Protocol (IGMP) is a communications protocol used by hosts and adjacent routers on IPv4 networks to establish multicast group memberships. Explain how IGMP functions to achieve its objectives. (2 marks)

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