



**UNIVERSITY OF COLOMBO, SRI LANKA**

**UNIVERSITY OF COLOMBO SCHOOL OF COMPUTING**

**DEGREE OF BACHELOR OF INFORMATION TECHNOLOGY (EXTERNAL)**

*Academic Year 2019 – 2<sup>nd</sup> Year Examination – Semester 4*

***IT4405 – Computer Networks***  
***Part 2 - Structured Question Paper***

***24<sup>th</sup> November, 2019***  
***(ONE HOUR)***

**To be completed by the candidate**

BIT Examination Index No: .....

**Important Instructions:**

- The duration of the paper is **1 (one) hour**.
- The medium of instruction and questions is English.
- This paper has **3 questions** and **8 pages**.
- **Answer all questions.** All questions **do not** carry **equal** marks.
- **Write your answers** in English using the space provided **in this question paper**.
- Do not tear off any part of this answer book.
- Under no circumstances may this book, used or unused, be removed from the Examination Hall by a candidate.
- Note that questions appear on both sides of the paper.  
If a page is not printed, please inform the supervisor immediately.
- Calculators are **not** allowed.

**Questions Answered**

Indicate by a cross (×), (e.g. 

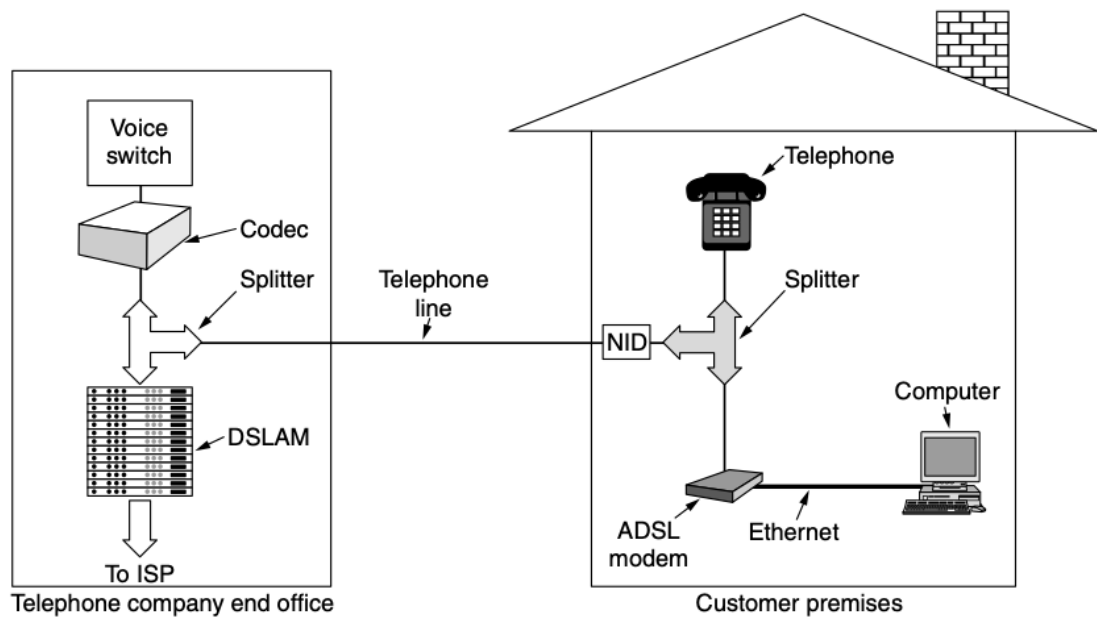
×
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) the numbers of the questions answered.

To be completed by the candidate by marking a cross (×).	Question numbers			Total
	1	2	3	
To be completed by the examiners:				

- 1) (a) Draw a diagram depicting the components of an ADSL network indicating the equipment at the ISP and the home.

[10 marks]

**ANSWER IN THIS BOX**

- (b) What is the reason to have asymmetric (high downlink and low uplink) bandwidth in a typical ADSL connection given to home users?

[10 marks]

**ANSWER IN THIS BOX**

Home users use the network mainly for web browsing. The requests sent towards a server are usually very small compared to the responses. Therefore, it is better to allocate relatively small amount of bandwidth to the uplink compared to the downlink.

- (c) The equipment commonly named as a “router” at the home end of an ADSL network is much more than a router. What are the main functionalities of this equipment?

[10 marks]

**ANSWER IN THIS BOX**

This equipment acts as an ADSL modem, a NAT, a DHCP server and also a gateway.

- (d) A machine on an ADSL home network has the IP address 192.168.1.2. An IP packet sent from this network has reached a server, but the source IP of the packet is found to be 192.248.16.99. What is the probable cause for this difference in the IP addresses?

[10 marks]

**ANSWER IN THIS BOX**

The IP of the machine is a private IP. The machine is connected to the public Internet through a NAT box. The NAT rewrites the source address to reflect its own public IP address and it must be 192.248.16.99.

- 2) (a) An organization decided to change its web server, www.bit.lk. It also decided to keep the current web server, with its current IP address, as www1.bit.lk. The network administrator changed the DNS A record for www.bit.lk to point to the IP address of the new server and the A record of www1.bit.lk to point to the IP address of the old server. Users who tried to connect to www.bit.lk immediately after this change complained that they still get the content from the old server. Describe two possible causes for this problem.

[15 marks]

**ANSWER IN THIS BOX**

DNS records are cached. Therefore, the name resolution query may still return the old IP address from the cache. In addition, the web content may also have been cached in the web caches. It is possible to get the old content from these caches as well.

- (b) An organization has decided to use a mail server provided by a cloud service provider. The provider has already agreed to provide the service and has given the IP address of the assigned mail server to the network administrator of the organization. The organization also wants to keep the current mail server running as well to receive mail in case of a failure in the cloud server. Describe the changes required in the network infrastructure and services to ensure that all mail for the organization are sent to the new mail server.

[15 marks]

**ANSWER IN THIS BOX**

Two MX records are needed. One MX record of the DNS record for the organization should point to the new mail server and another with a low priority should point to the old server.

- 3) A machine X is on a LAN L1 and a machine Y is on LAN L2. The MAC address of X is M(X) and the IP address is IP(X). Similarly, the MAC address of Y is M(Y) and the IP address is IP(Y). The gateway R is on both L1 and L2. R's interface on L1 is R1 with the MAC address M(R1) and the IP address IP(R1). R's interface on L2 is R2 with the MAC address M(R2) and the IP address IP(R2). There are no other gateways on L1 or L2. An IP packet, P, is sent from X to Y.

- (a) What is the source MAC address of the frame that contains P when it reaches Y? Justify your answer.

[10 marks]

**ANSWER IN THIS BOX**

It is M(R2). R must have forwarded the P to Y. Therefore, it should have M(R2) as the source MAC address.

- (b) What is the source IP address of P when it reaches Y? Justify your answer.

[10 marks]

**ANSWER IN THIS BOX**

There is no reason to change the source IP. Therefore, it must be IP(X)

- (c) What is the destination MAC address of the frame that contains P when it leaves X? Justify your answer.

[10 marks]

**ANSWER IN THIS BOX**

P has to be sent through the gateway R. Therefore, the destination MAC address should be M(R1).

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