NATIONAL SCHOOL OF BUSINESS MANAGEMENT

BSc in Management Information Systems (Special) (NSBM)– 20.2/20.3
BSc (Hons) in Software Engineering (NSBM)– 20.2/20.3
BSc (Hons) in Computer Science (NSBM)– 20.2/20.3
BSc (Hons) in Computer Networks (NSBM)– 20.2/20.3

Year 02 Semester 01 Examination
CN201.3 – Computer Networks
08 June 2022

Instructions to Candidates

1) Answer Any 5 Questions from the 6 Questions given.
2) **The duration of the question paper is 5 hours. Including half an hour to download the paper and upload your answers in a single file**. (Note: **No email submissions are accepted under any condition.)**
3) Weightage of Examination: 60% out of final grade
4) Download the paper, provide answers to the selected questions in a word document.
5) Please upload the document with answers (Answer Script) to the submission link before the submission link expires
6) Answer script should be uploaded in PDF Format
7) Under any circumstances E-mail submissions would not be taken into consideration for marking. Incomplete attempt would be counted as a MISSED ATTEMPT.
8) The Naming convention of the answer script – Module Code_Subject name_Index No
9) You must adhere to the online examination guidelines when submitting the answer script to N-Learn.
10) Your answers will be subjected to Turnitin similarity check, hence, direct copying and pasting from internet sources, friend's answers etc. will be penalized.

Question 1

Protocols plays a major role in data communications while medium defines the technical implementation for the communication.

a.) What are the *other* main components involved for a successful data communication? Justify the existence of the of these components for the success of the communication

[4 Marks]

b.) Define the 2 main categories of the medium and briefly explain main considerations in selecting the suitable communication medium for a LAN covering a university.

[6 Marks]

c.) One network application may use different protocols in different layers in the ISO/OSI architecture. Explain the requirement of using different protocols referring to a suitable network application.

[6 Marks]

d.) Define the 2 main network application architectures and discuss the advantages and limitations of each architecture referring to suitable network applications.

[4 Marks]

Question 2

Designing an efficient and effective computer network for an organization needs a methodical approach.

a.) Comment on the above statement briefly explaining the approach used in designing a network for a small organization.

[3 Marks]

b.) Briefly explain the considerations in a physical infrastructure design of a network.

[4 Marks]

c.) Requirements of a computer network derived from many aspects. List 4 main aspects of requirements and briefly describe the importance of one aspect listed above.

[5 Marks]

d.) Explain two measures of operational requirements which effects the reliability, maintainability, and availability of the network.

[4 Marks]

e.) Briefly explain why the operational suitability of a network is an important measure for an organization.

[4 Marks]

Question 3

Network topology defines the arrangement of a network that comprises nodes and connecting lines via sender and receiver

a.) List 2 main topologies commonly used in LAN, and WAN.

[2 Marks]

b.) It is hard to differentiate the topologies in as LAN or WAN topology. Comment on the statement.

[3 Marks]

c.) Addressing is required to communicate between network applications.

i. List 3 types of addressing schemas used in different layers in OSI model.

[2 Marks]

ii. Briefly explain how the above listed addressing schemas are used to communicate between 2 network processes. You may select a suitable network application for your explanation.

[6 Marks]

d.) Network segmentation can be used to provide access rights and privileges to users who truly need it. Briefly explain how the network segmentation is used in the university environment.

[7 Marks]

Question 4

The network layer uses two addressing versions which are not compatible with each other.

a.) 123.321.123.132 is NOT a valid IPv4 Address. Technically explain why it is not a valid IP address.

[2 Marks]

b.) Briefly explain the requirement of subnetting for an organization which is having different departments and network application requirements.

[3 Marks]

c.) A network administrator defines a network as "123.231.14.32/27"

   a. Technically derive the important parameters of the network referring the above representation.

   [3 Marks]

   b. If the above network is required to device in to 2 subnets, briefly explain how it can be done. You need to derive the subnets and important parameters of each network.

   [3 Marks]

d.) Requirement of large IP address space is one of the major reasons for introducing IPv6. Briefly explain any other 2 design goals of IPv6.

[3 Marks]

e.) 123.231.14.32/27 and 2004:DF0:17: :/48 IP address blocks has assigned to an organization which has 3 main divisions. The management has decided to use the IPv4 block for the server network and use the IPv6 for internal communication. As the network engineer of the organization, prepare an IP address allocation plan for the organizational network which having separate IP networks for the divisions and for the server network which needs to communicate with IPv4 and IPv6 external resources.

[6 Marks]

Question 5

Layer 2 addressing is used for the internal communication within the subnet whereas the layer 3 addressing is used for the external communication.

a.) Technically explain how the layer 2 addressing and switching is used to deliver the data within the subnet. You may use a suitable subnet for the explanation.

[4 Marks]

b.) If the destination is outside the subnet, briefly explain how the communication is initiate with the destination.

[2 Marks]

c.) What is a default route of a router? Explain how the default route is selected to route packets to a destination node.

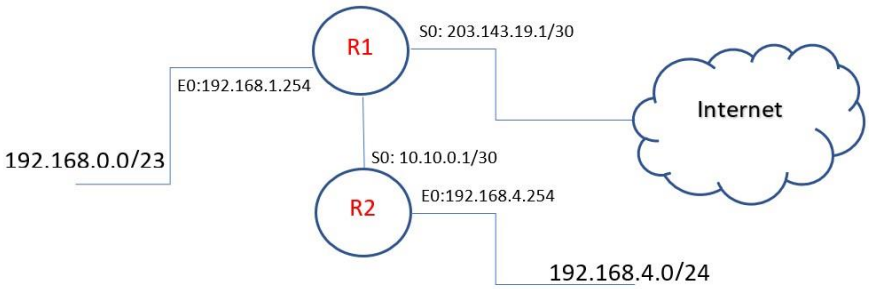
[4 Marks]

d.) Briefly explain the advantages of link state routing algorithm over distance vector routing algorithm in intra-Autonomous system routing.

[4 Marks]

e.) As given in the below network diagram with common notations, users in LAN 192.168.4.0/24 network are allowed to access Internet via R1. Define the routing tables in R1 and R2 which facilitates the above requirement.

[6 Marks]



Question 6

a.) Define the 3 types of Active attacks on computer networks and briefly explain how they are affecting the CIA tried of the security.

[4 Marks]

b.) An organizational network was attacked several times by external parties. Propose a suitable technical implementation to detect attacks and protect the IT resources of the organization. You need to identify required security devices and provide network diagram with proposed devices.

[5 Marks]

c.) Briefly explain how Cryptography provides confidentiality, integrity, and availability for the data communication.

[4 Marks]

d.) Managing an operational computer network of an organization is a key for efficient and effective business process of the organization.

a. Define the five functional areas of network management.

[2 Marks]

b. Briefly describe how the network management tools and protocols are used to manage the network in above listed five functional areas. You need to include suitable network management tools and protocols in providing the answer.

[5 Marks]

********** End of the Exam Paper **********