U.S.N.										

B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

February / March 2023 Semester End Main Examinations

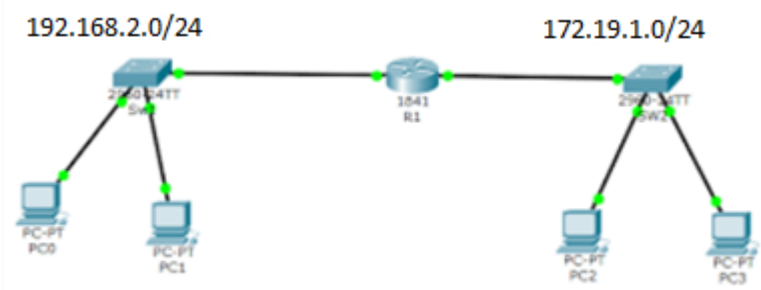
Programme: B.E. **Semester: V**
Branch: Information Science and Engineering **Duration: 3 hrs.**
Course Code: 20IS5PCDCN **Max Marks: 100**
Course: Computer Networks - 1 **Date: 27.02.2023**

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

UNIT - I

1 a) In the given diagram network address is given for both the networks.Assign the remaining IP address and Gateway address. **04**
Draw the corresponding TCP/IP layered representation of communication from host devices PC0 to PC2.



b) Distinguish between time domain and frequency domain representation of a signal with a neat diagram. **04**

c) Given a channel with an intended capacity of 20 Mbps. The bandwidth of the channel is 3MHz. What signal-to-noise ratio is required in order to achieve this capacity? **04**

d) A PCM encoder accepts a signal with a voltage signal with amplitude V_{min} = -40V and V_{max} = +40V. Quantization levels=8. Sampled values are = -6.1, 7.5, 16.2, 19.7, 11.0, -5.5, -11.3, -9.4, -6.0. **08**

i) Calculate zone width
ii) What is the Quantization step size (range of each interval)?
iii) Calculate number of bits to encode.

With calculation, explain quantization and encoding process with diagram.

UNIT - II

2 a) A bit stream 10011101 is transmitted using the standard CRC method. The generator polynomial is x^3+1. **08**

1. Calculate the actual bit string transmitted
2. Suppose the third bit from the left is inverted during transmission. Show the calculations and how will receiver detect this error.

b) Consider sender and receiver window size of 4 and represent sliding window protocol and Go back-N protocol. For the following frame transmissions given below: **08**

i) Frame 0 is transmitted and successfully acknowledged
ii) Frame 1 is lost
iii) Frame 2 is transmitted
iv) Frame 3 is transmitted

Compare between sliding window protocol and Go back-N protocol for both and represent the acknowledgement for all the scenarios.

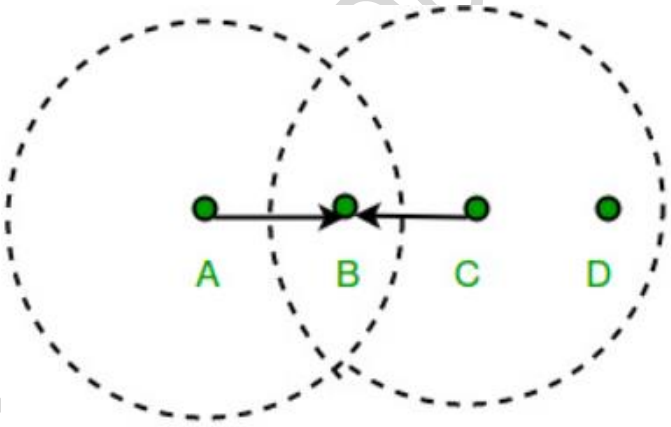
c) The following character encoding is used in a data link protocol: A: 01000111; B: 11100011; FLAG: 01111110; ESC: 11100000 Show the bit sequence transmitted (in binary) for the four-character frame: A B ESC FLAG when each of the following framing methods are used: **04**

(a) Character count
(b) Flag bytes with byte stuffing.
(c) Starting and ending flag bytes, with bit stuffing.

UNIT - III

3 a) A pure ALOHA network transmits 200 bit frames on a shared channel of 200kbps. what is the throughput if the system (all station together) produces 250 frames per second? Draw the comparisons between pure aloha and slotted aloha. **06**

b) Consider the situation depicted in the figure, where each of four nodes is able to send and receive signals that reach just the nodes to its immediate left and right. **06**



Suppose both A and C want to communicate with B, is there any collision? Is this collision noticed by the nodes A and C? If so, give your justification?

c) Illustrate the 802.11 frame structure with a neat diagram. **08**

UNIT - IV

4 a) Given the class C 192.168.0.0 IP address and subnet mask of 255.255.192.0. Find the total number of subnets that can be formed, broadcast address and valid host range for each subnet. **06**

b) The organization is allotted with a network IP address 172.1.0.0/14. The organization decides to create subnetworks for 4 departments of equal length. Design the sub-networks. **10**

For each of these, give the network address, broadcast address, find the IP address assigned, the last IP address assigned and the mask in the w.x.y.z/s notation.

c) An IPv4 packet has arrived with the first few hexadecimal digits as shown. **04**
0x45000028000100000102 . . .
How many hops can this packet travel before being dropped? The data belong to what upper-layer protocol?

OR

5 a) I. A router outside the organization receives a packet with destination address 190.240.7.91 /16. Show how it finds the network address to route the packet. **05**

II. Given the address 23.56.7.91, find the network address and class.

b) An IP router with a Maximum Transmission Unit (MTU) of 200 bytes has received an IP packet of size 520 bytes with an IP header of length 20 bytes. Calculate the number of fragments and offset? **05**

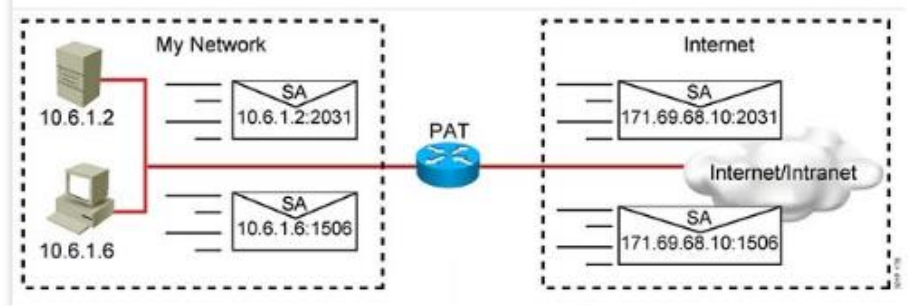
c) Design a company which consists of three department's Central department is connected to all the remaining two departments. The requirement of the host for each department is as follows. Assume the IP address 198.1.2.0/24. For each of these, give the network address, broadcast address, first IP address assigned, the last IP address assigned, and the mask in the w.x.y.z/s notation. **10**

1. Central Department 1 ------100 hosts
2. Department 2 -------64 hosts
3. Department 3------ 16 hosts

UNIT - V

6 a) Identify the different message formats of ICMP protocol and illustrate with a neat diagram. **10**

b) For the given figure explain the process of natting and construct the natting table for the same. **05**

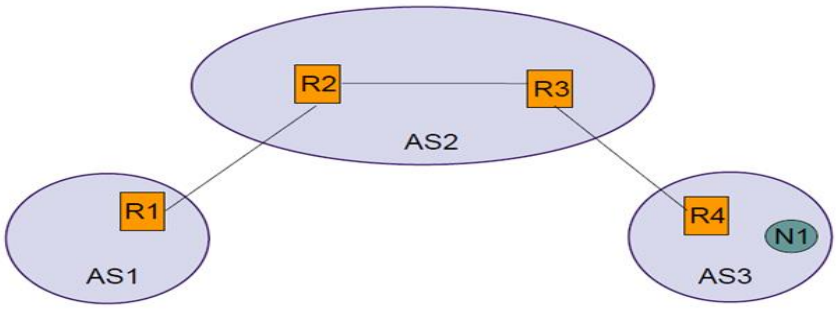


c) Identify the five different Message types of OSPF. **05**

OR

7 a) Differentiate between the static and dynamic routing. Give example for each. **05**

b) Identify the routing protocol required for the diagram. How routing takes place in the scenario. **05**



c) Explain the challenges with respect to *OSPF*. **05**

d) Explain the process of tunneling with dual stack router with a diagram. **05**

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