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VIT
Vellore Institute of Technology

Slot: F1+TF1

School of Computer Science Engineering and Information Systems

Fall Semester 2023-2024

Continuous Assessment Test – I

Programme Name & Branch: MCA

Course Name & code: Data Communication and Networking (PMCA505L)

Class Number (s): VL2023240106191, VL2023240106192, VL2023240106195

Faculty Name (s): Prof. ArivuSelvan K, Prof. Asis Kumar Tripathy & Prof. Ushapreethi P

Exam Duration: 90 Min. **Maximum Marks: 50**

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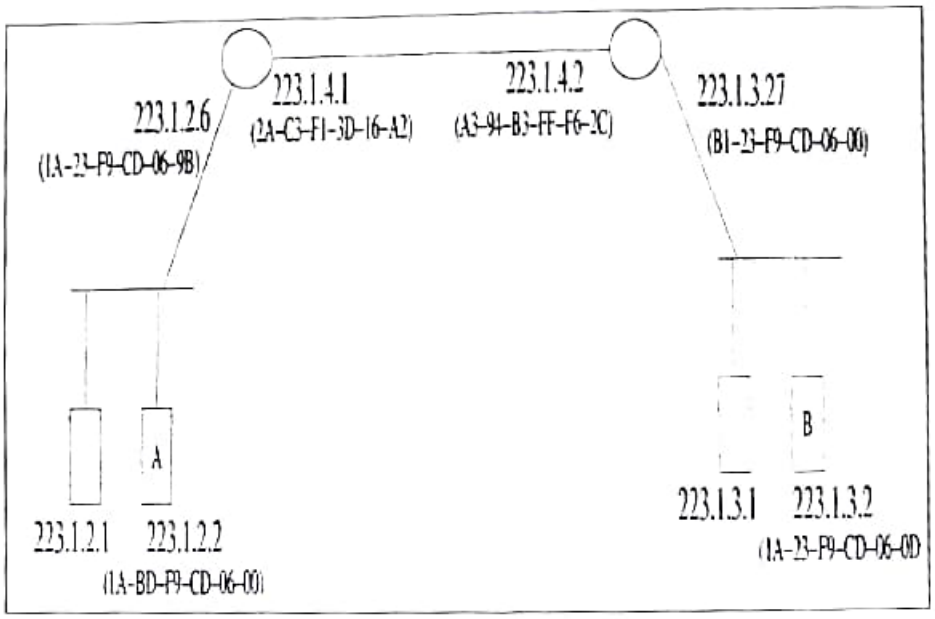
1. (a) What is the bandwidth of a signal that can be decomposed into five sine waves with frequencies at 0, 20, 50, 100, and 200 Hz? Draw the spectrum, assuming all components have a maximum amplitude of 5V. **[4M]**

(b) A periodic composite signal with a bandwidth of 2000 Hz is composed of two sine waves. The first one has a frequency of 100 Hz with a maximum amplitude of 20 V; the second one has a maximum amplitude of 5 V. Draw the bandwidth. **[3M]**

(c) A non-periodic composite signal has a bandwidth of 300 kHz, with a middle frequency of 180 kHz and peak amplitude of 15 V. The two extreme frequencies have an amplitude of 4V. Draw the frequency domain of the signal. **[3M]**

2. (a) The figure below gives a network topology of hosts and routers, and the corresponding MAC and IP addresses.



Assume that **host A** sends a message/packet to **host B** (using the route that is indicated in the above figure). For each hop over which the message/packet travels, indicate the source and destination MAC and IP addresses that are used in link layer, and network layer. Show the details in PDU format. **[5M]**

(b) Assume seven devices are installed in a mesh, star topology. For each topology calculate the number of cables & ports needed (for each device). Draw the design of the topology. **[5M]**

3. List in order, the five layers of the Internet protocol stack. For each layer, provide a brief description of what that layer does, and provide an example of a protocol or specific networking technology associated with that layer. **[10M]**

4. (a) Estimate your idea on how guided media differ from unguided media? Briefly explain any three methods used for data communication using guided media and two methods using unguided media. **[5M]**

(b) List out three important characteristics of Analog Signals and explain them with necessary diagrammatic representations. **[5M]**

5. (a) Assume four sine waves with frequencies 4, 8, 10, 12 and its corresponding peak amplitudes 6, 10, 13 & 15. Plot the sine wave using time domain and frequency domain representation. **[6M]**

(b) Draw a hybrid topology with a ring backbone and three bus networks. **[4M]**

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