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**UNITED STATES INTERNATIONAL UNIVERSITY – AFRICA (USIU)**

**SUMMER SEMESTER 2022 CLASS ASSIGNMENT II**

**APT2050: COMPUTER NETWORKS & TELECOMMUNICATIONS**

**INSTRUCTOR: DR. ABRAHAM NYETE**

**21st July 2022 TIME ALLOCATED: 1 HR 40 MIN**

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***INSTRUCTIONS:***  ANSWER ALL **3 (THREE)** QUESTIONS

AJIBADE SAMANTHA FOLASHADE 661713

**…………………………………………………………………………………………….**

1. Given the subnet: 210.34.2.0/24. Perform the following tasks:

1. Determine the number of bits to be borrowed to Create 8 subnets.

**2m = 8**

**23**

**m = 3**

1. Write down the new subnet mask

**/24 + 3 = /27**

1. Write down the number of Hosts in one subnet

**2n-2** **11111111.11111111.11111111**.11100000

**25-2**

**32-32 = 30**

1. Write down the subnet ranges **[10 Marks]**

**Increment = 32**

**210.34.2.0 – 210.34.2.31**

**210.34.2.32 – 210.34.2.63**

**210.34.2.64 – 210.34.2.95**

**210.34.2.96 – 210.34.2.127**

2. Given the subnet: 200.17.78.0/24. Perform the following tasks:

1. Determine the number of bits required to Create subnets with 4 hosts per subnet.

**2n-2 = 4**

**2n= 4 + 2**

**2n = 6**

**nlog2 = log 6**

**n = log6/log2**

**n = 2.584**

**n = 3**

1. Write down the new subnet mask

**32 – 3 = /29**

1. Write down the number of Hosts in one subnet

**2n-2**

**23-2**

**8-2**

**=6**

1. Write down the first five subnet ranges **[10 Marks]**

**210.17.78.0 – 210.17.78.7**

**210.17.78.8 – 210.17.78.15**

**210.17.78.16 – 210.17.78.23**

**210.17.78.24 – 210.17.78.31**

**210.17.78.32 – 210.17.78.39**

3. (a) The flooding routing mechanism is very robust. Explain how this routing mechanism works.

**[4Marks]**

In the flooding routing mechanism there is no network information required because a packet is sent by a node to every neighboring node

(b) Signaling System Number 7 (SS7) is the Common channel signaling scheme used in ISDN based networks optimized for 64k digital channel network for Call control, remote control, management and maintenance, providing a reliable means of transfer of info in sequence. Write down and explain the functions of the different components in this signaling framework. **[4Marks]**

* **Control Plane – establishes as well as manages connections**
* **Signaling Point – has the capacity to handle ss7 control message**
* **Information Plane – if a connection is set up, info is transferred on the information plane**
* **Signal Transfer Point – has the capacity to route control messages**

(c) List four multiplexing techniques. **[2marks]**

1. **Frequency Division multiplexing**
2. **Time Division Multiplexing**
3. **Wavelength Division Multiplexing**
4. **Code Division Multiplexing**

(d) Explain the working principles of stop and wait and sliding window flow control mechanisms.

**[6 Marks]**

**Stop and Wait**

* **1 frame = 1 acknowledgment**
* **The next frame will only be transmitted after the acknowledgment has been received**
* **It is slow because it is used to transfer a few frames**

**Sliding Window**

* **Multiple frames are transmitted before an acknowledgment is issued**
* **Frames are numbered sequentially**
* **Faster than stop and wait**

(e) The High Level Data Link Control (HDLC) is the most important data link control protocol. To satisfy a variety of applications, HDLC defines three types of stations, two link configurations, and three data transfer modes of operation. List down the three types of stations, and explain the differences between them. Also state the two link configuration without explaining them. **[4 Marks]**

**Primary station**

* **in charge of link operation**
* **The primary station issues frames known as commands**
* **Maintains separate logical link to each secondary station**

**Secondary station**

* **Under control of primary station**
* **Frames issued called responses**

**Combined station**

* **Acts as both a primary and secondary station**

**The two link configurations are unbalanced and balanced**