Jahangirnagar University

Institute of Information Technology

2nd Year 1st Semester B.Sc. (Honors) Final Examination-2020

Course No. # ICT 2109
Course Title# Data and Telecommunication

Examination Roll No. #	**192340**
Registration No. #	**20193650283**
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Final Assignment

Date: 13, Aug , 2021

Instructions:

1. Examinee must write his/her exam roll no. and page no. at the top of every page of the script.
2. Do not write your name or any identification mark anywhere of the script.
3. Total time for exam is 45 minutes. You will get 15 additional minutes for submission.
4. Delay in submission is not acceptable.
5. You have to submit your exam script in PDF format.
6. The examinee must submit the examination script **through online (Google classroom/email/google form etc.)** as prescribed by the examiner.
7. You must use **your EXAM ID** only for naming your submitted file.
8. After completing the exam, you must write the total number of pages used for the exam in the top sheet.

Answer to the question no – 1

We combine six 200 kbps sources into three 400 kbps. Now we have seven 400 kbps channel.

a. Each output frame carries 1 bit from each of the seven 400 kbps line.

Frame size = 7 × 1
= 7 bits. Ans.

b. Each frame carries 1 bit from each 400 kbps source.

Frame rate = 400,000 frames s^{-1}
Ans.

c. Frame duration = $\frac{1}{\text{frame rate}}$

$= \frac{1}{400000}$

$= 2.5\,\mu s$ Ans.

d. Output data rate = 400000×7

$= 2800000$ bps

$= 2.8$ Mbps

We can also calculate the output data rate as the sum of input data rate because there is no synchronizing bits.

Output data rate = $6 \times 200 + 4 \times 400$

$= 1200 + 1600$

$= 2800$ Kbps

$= 2.8$ Mbps Ans.

Answer to the question no – 2

We assume that the transmission time is negligible in this case. This means that we suppose all datagrams start at time 0. The arrival times are calculated as:

1. $\frac{3200}{2 \times 10^8} + 3 + 20 + 20 = 59.0$ ms

2. $\frac{11700}{2 \times 10^8} + 3 + 10 + 20 = 91.5$ ms

3. $\frac{12200}{2 \times 10^8} + 3 + 10 + 20 + 20 = 114.0$ ms

4. $\frac{10200}{2 \times 10^8} + 3 + 7 + 20 = 81.0$ ms

5. $\frac{10700}{2 \times 10^8} + 3 + 7 + 20 + 20 = 103.5$ ms

The Order of arrival is: $3 \rightarrow 5 \rightarrow 2 \rightarrow 4 \rightarrow 1$.

Answer to the question no-3

We use the formula $B = (1+d) \times (1/r) \times N$ but first we need to calculate the value of r for each case.

We known,

$1 \text{ kbps} = 1024 \text{ bps}$

$\therefore 6 \text{ kbps} = 1024 \times 6$

$= 6144 \text{ bps}$

a. ASK

$r = 1, \quad B = (1+1) \times (1/1) \times 6144$

$= 12288 \text{ Hz}$

b. QPSK

$r = 2, \quad B = (1+1) \times (1/2) \times 6144$

$= 3072 \text{ Hz}$