American International University- Bangladesh (AIUB)
Faculty of Engineering

Course Name:	Data Comm	**Course Code:**	CoE 3201
Semester:	Fall 2023-24	**Term:**	Final
Total Marks:	30	**Submission Date:**	24-12-2023
Faculty Name:	Sadman Shahriar Alam	**Assignment:**	01

Course Outcome Mapping with Questions

Item	COs	POIs	K	P	A	Marks	Obtained Marks
Q1	**CO5**	**P.f.2.C6**	**K7**	**P1, P3, P7**		**15**	
Q1	**CO5**	**P.f.2.C6**	**K7**	**P1, P3, P7**		**15**	
					Total:	**30**	

Student Information:

Student Name:	**NOKIBUL ARFIN SIAM**	**Student ID:**	**21-44793-1**
Section:	**G**	**Department:**	**CSE**

Marking Rubrics (to be filled by Faculty):

Problem #	Excellent [5]	Proficient [4]	Good [3]	Acceptable [2]	Unacceptable [1]	No Response [0]	Secured Marks
	Detailed unique response explaining the concept properly and answer is correct with all works clearly shown.	Response with no apparent errors and the answer is correct, but explanation is not adequate/unique.	Response shows understanding of the problem, but the final answer may not be correct	Partial problem is solved; response indicates part of the problem was not understood clearly.	Unable to clarify the understanding of the problem and method of the problem solving was not correct	No Response/(Copied/identical submissions will be graded as 0 for all parties concerned)	
1							
2							
Comments						Total marks (30)	

Use your ID AB-CDEFG-H

1. A voice channel occupies a bandwidth of **EFG** kHz. (E, F, and G need to be multiplied together to find the bandwidth. If any value among those 3 digits is zero, consider the next digit from your ID for calculation.) 10 voice channels are to be multiplexed together using the FDM (Frequency Division Multiplexing) technique, considering a guard band of **(C+D)** kHz. Illustrate the configuration of the multiplexing and demultiplexing using the frequency domain with proper labeling.
2. We have four sources, each creating **CDE** *8-bit* characters per second. (C, D, and E need to be multiplied together to find the bandwidth. If any value among those 3 digits is zero, consider the next digit from your ID for calculation.) If the interleaved unit is a character and *1* synchronizing bit is added to each frame, find (a) the data rate of each source, (b) the duration of each character in each source, (c) the frame rate, (d) the duration of each frame, (e) the number of bits in each frame, and (f) the data rate of the link.

V ID: 21-44793-1
AB-CD EFG-H

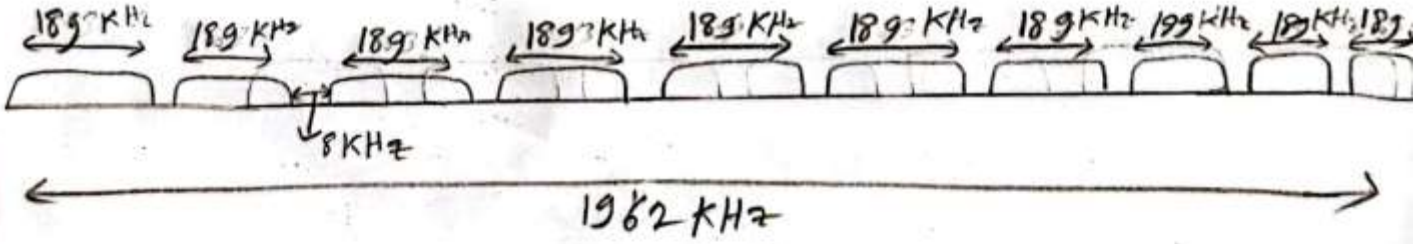
EFG = 7 × 9 × 3 = 189 KHz

C+D = 4+4 = 8

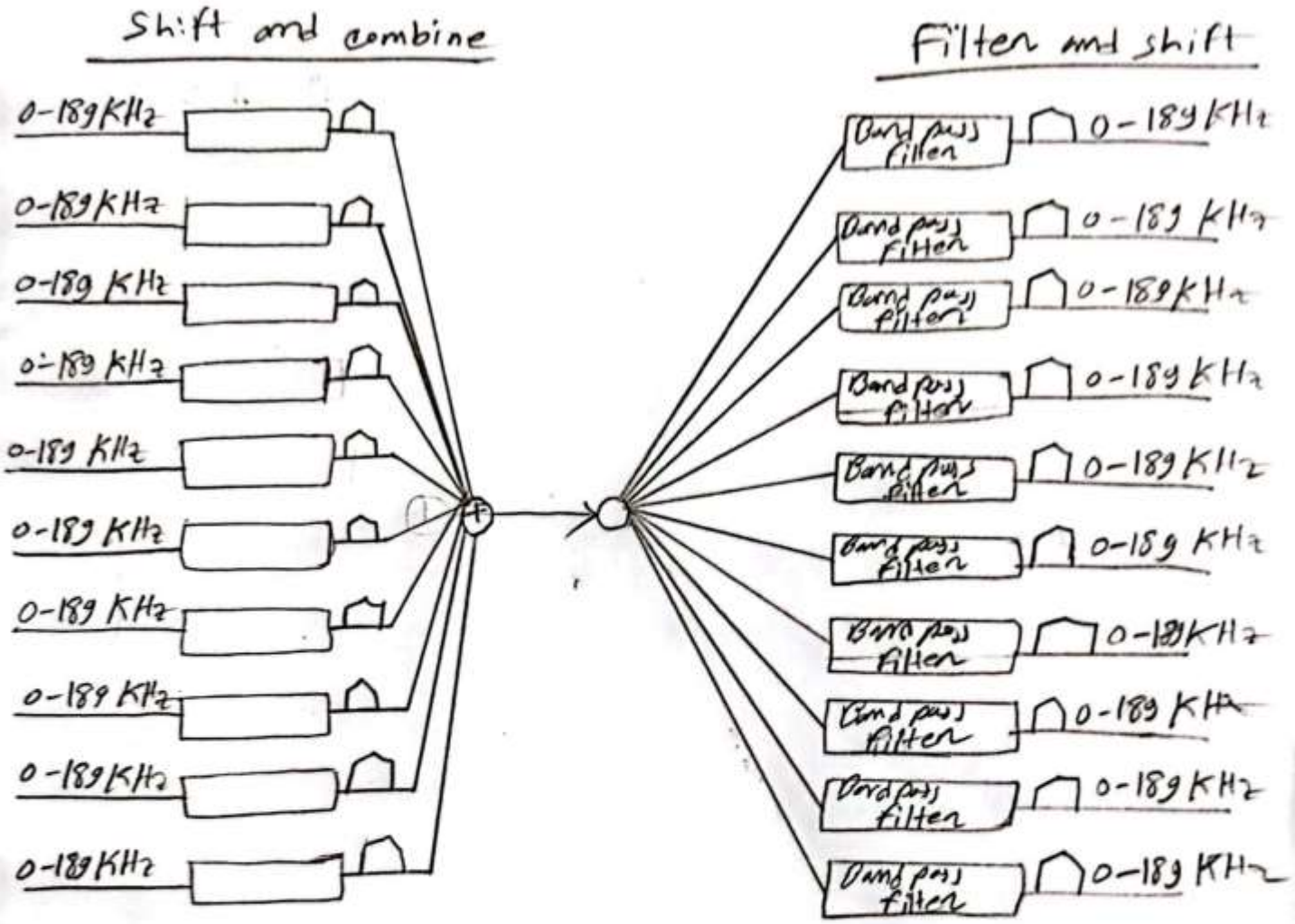
Each channel occupies a bandwidth of 189 KHz.

Voice channel = 10

guard band = 8 KHz



Minimum required bandwidth = (10 × 189) + (9 × 8)
= 1962 KHz

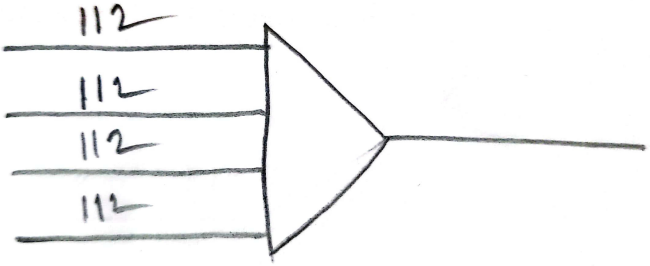


2) ID: 21-44793-1

CDE = 4×4×7 = 112

a) Data rate of each source = 112×8

= 896 bps



b) Each source sends = 112 character/second

duration of each character, $\frac{1}{112} = 8.93$ ms

c) Frame rate is same as input source 112 frame/s.

d) Duration of each frame,

$$\frac{1}{112} = 8.93 \text{ ms.}$$

e) The number of bits in each frame = $4 \times 8 + 1 = 33$ bits

f) Data rate = 112×33

= 3696 bps