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| AIUB | **American International University- Bangladesh (AIUB)**  **Faculty of Engineering** | | | |
| **Course Name:** | Data Communication | **Course Code:** | CoE 3201 | |
| **Semester:** | Spring 2023-24 | **Term:** | Final | |
| **Total Marks:** | 30 | **Submission Date:** | 12-5-2024 | |
| **Faculty Name:** | Sadman Shahriar Alam | **Assignment:** | | 01 |

Course Outcome Mapping with Questions

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| **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:**

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| **Student Name:** |  | **Student ID:** |  |
| **Section:** |  | **Department:** |  |

**Marking Rubrics (to be filled by Faculty):**

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| **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) |  |

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| **Use your ID AB-CDEFG-H**  *(If any value in your ID is zero, consider the next digit from your ID for calculation.)*  **1.** An internet service provider (ISP) has a network with multiple users requiring different bandwidth allocations. The ISP needs to multiplex the traffic of 7 users, each with different bandwidth requirements, using Frequency Division Multiplexing (FDM). The bandwidth requirements of the users are as follows: User 1 needs (B+C) Mbps, User 2 needs (C+D) Mbps, User 3 needs (D+E) Mbps, User 4 needs (E+F) Mbps, User 5 needs (F+G) Mbps, User 6 needs (G+H) Mbps, and User 7 needs (H+E) Mbps.  To multiplex the traffic efficiently, a guard band of (G+H+B+5) Mbps is required between each user's bandwidth allocation to avoid interference. Illustrate the configuration of the multiplexing and demultiplexing using the frequency domain with proper labeling. Compute the minimum bandwidth requirement as well.  **2.** A telecommunications company is designing a multiplexing system for transmitting data from six different sources. Each source generates data at varying rates. The bandwidth requirements for multiplexing are as follows: Source 1 requires (B+C) Mbps, Source 2 requires (H+E) Mbps, Source 3 requires (D+E) Mbps, Source 4 requires (G+H) Mbps, Source 5 requires (C+D) Mbps, and Source 6 requires (E+F) Mbps. The multiplexing technique to be used is Statistical Time Division Multiplexing (STDM).  Given the requirements above, find:  (a) What is data rate management technique that can be used for multiplexing  (b) The data rate of each source.  (c) The duration of each character in each source.  (d) The frame rate.  (e) The duration of each frame.  (f) The number of bits in each frame.  (g) The data rate of the link. |