ECE270: ELD: Quiz 5 (15 Minutes)

Date: Nov. 9, 2023

1. Find out whether the given starting address is valid. If it is not valid, identify the nearest valid address. Also, find out the total wastage of memory between given and valid starting address.

IP1	32 MB	0x4002_0000
IP2	2 GB	0x0020_8000_0000

8 Marks

IP1:

- **The given starting address is invalid since any starting address for an IP with 32MB of memory space must have 25 zero bits at LSB. The address 0x4002_0000 has only 17 zero bits.**
- **The valid starting address is 0x4200_0000 with 25 zero LSBs.**

2 Marks

- **Total number of addresses wasted between 0x4002_0000 and 0x4200_0000 is 0x01FDFFFF. This corresponds to approximately 32 MB**

2 Marks

IP2

- **The given starting address is valid since any starting address for an IP with 2 GB of memory space must have 31 zero bits at LSB. The address 0x0020_8000_0000 has 31 zero bits.**

2 Marks

- **No wastage of memory**

2 Marks

2. Explain the need of direct memory access (DMA)
   - DMA acts as co-processor to main processor for time-consuming memory transfer tasks.
   - Processor configures the DMA to perform the transfer of data from source to destination. This allows the processor to remain idle/available for critical tasks/events since there is no need for process to perform each transfer of data. This improves the system efficiency and throughput.
   - DMA informs the processor about the status of transfer via polling or interrupt mode.
   - DMA do not process the data. It only transfers the data from one place to another.

2 Marks