Computer Architecture

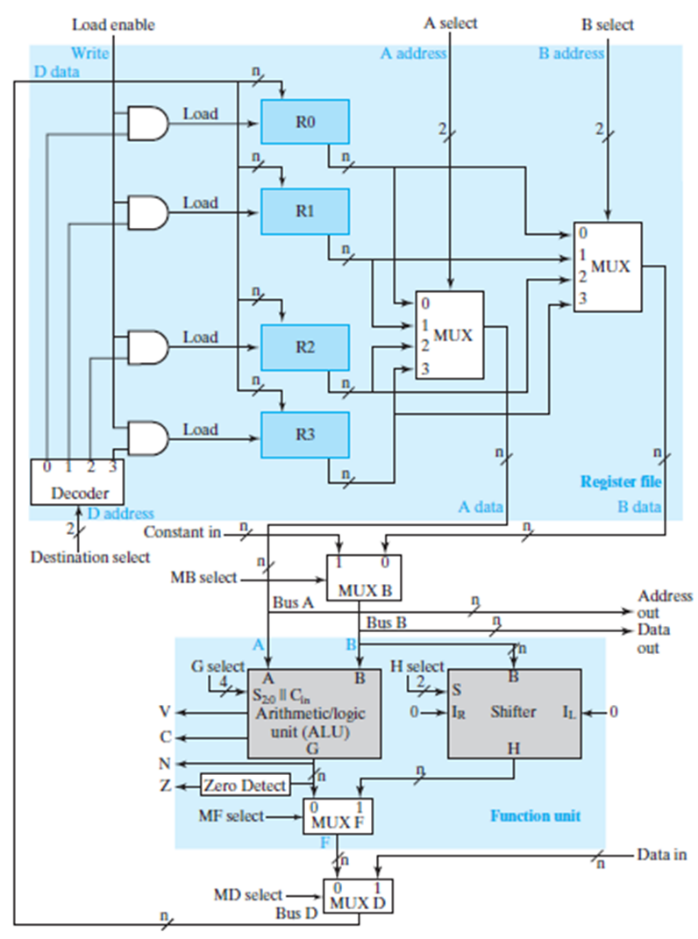
Mid Term Exam

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Instructions:

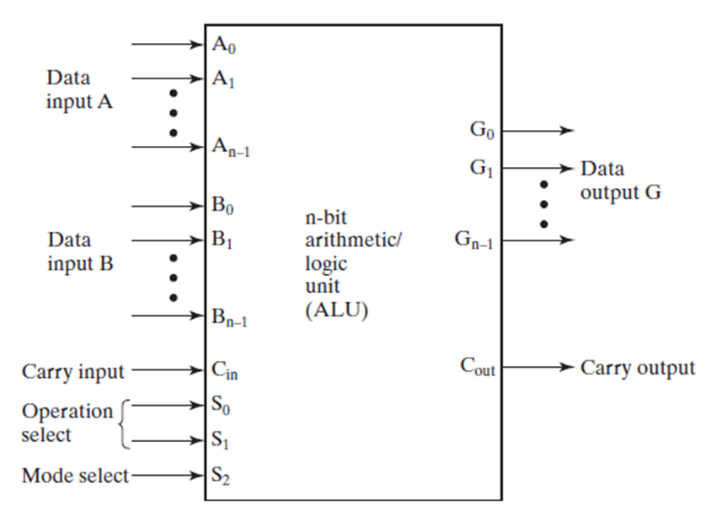
1. You can consult your notes but cannot ask for help to other students.
2. Calculators are allowed.
3. Time allowed is 1 hour 30 minutes. Marks will be deducted for late submission.
4. Total weightage of this exam is 30 marks.

Figure

Q. 1 Refer to figure 1 and describe how this CPU will do memory operation (reading from memory and writing to memory? (2 marks)

Q. 2 Refer to figure 1 and describe the function of control signals Load Enable and Destination Select? (2 marks)

Q. 3 Refer to figure 1 and mention the changes in terms of control signals that need to make to have 8 registers? (3 mark)

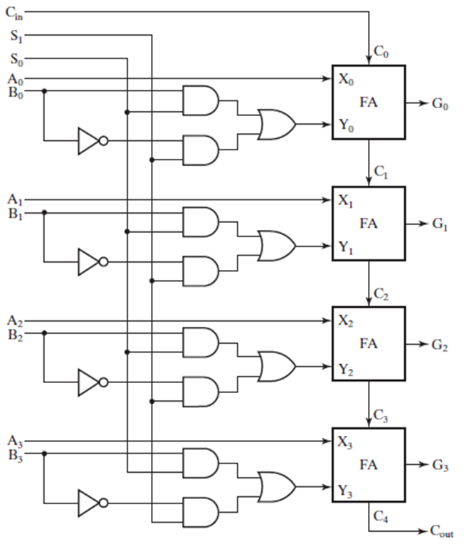


Figure

Q.4 Refer to figure 2 and relate the signals in figure 2 with signals in figure 1. Example is given below (4 marks)

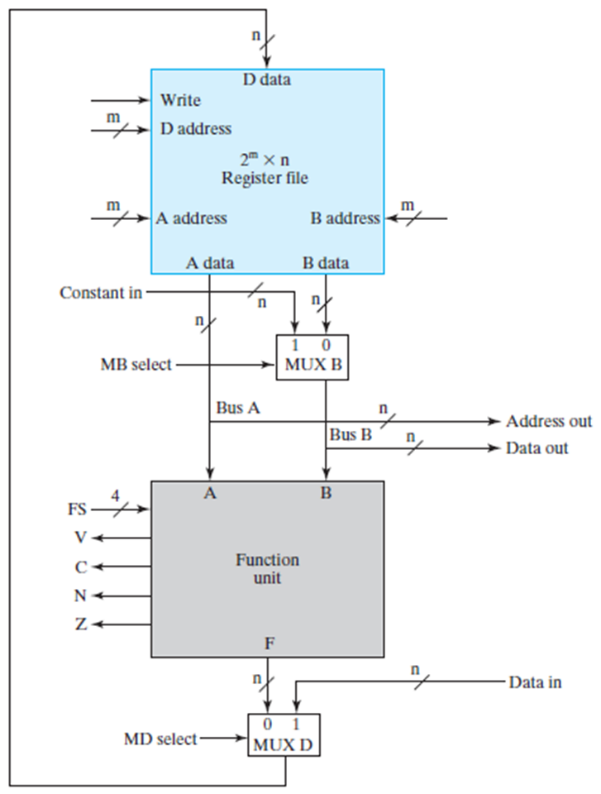
|  |  |
| --- | --- |
| Figure 2 Signals | Figure 1 Signals |
| Data input A | Bus A or A |
| Data input B |  |
| Carry input |  |
| Operation select S0 |  |
| Operation select S1 |  |
| Mode select |  |
| Data output G |  |
| Carry output |  |
|  |  |

Q.5 What binary values are required on inputs Cin, S1 and S2 to subtract number “B” from number “A” in figure 3? (2 mark)



|  |  |
| --- | --- |
| Signal | Value |
| Cin |  |
| S1 |  |
| S2 |  |

Figure



Figure

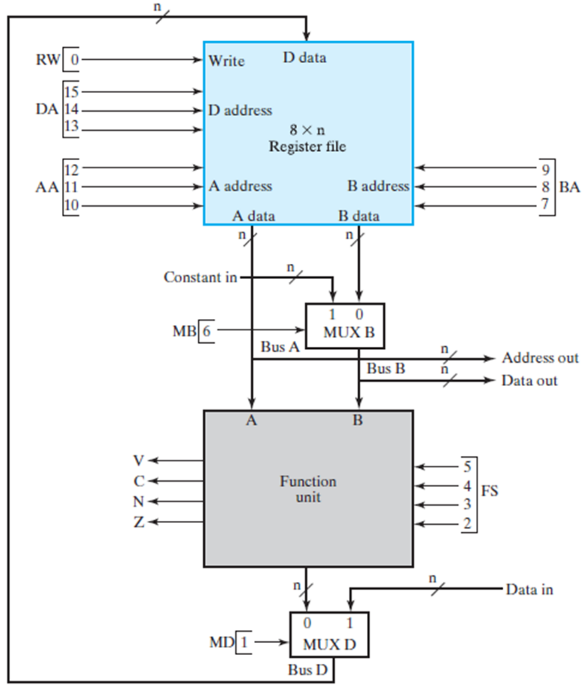
Q.6 Refer to figure 4 and answer below (4marks):

A. For having a 16 registers with each register of 16 bits, how many flipflops would be required? \_\_\_\_\_\_\_\_\_\_

B. For having a 16 registers with each register of 16 bits, how many bits would be required in B Address? \_\_\_\_\_\_\_\_\_\_\_

C. How many different functions can be done by the Function Unit? \_\_\_\_\_\_\_\_\_\_\_

D. The purpose of Mux D is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.



Figure

Q.7 Refer to figure 5, write the control word for the following instructions (6 marks)

R3 = R2 + R1

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

R4 = R6 – R5

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

Q.8 What is the purpose of register “PC” and how it works (3 marks)?

Q.9 Explain the purpose of following instruction format and how it works?

Graphical user interface, table

Description automatically generated