**CSE 341: Microprocessors**

**Department of Computer Science and Engineering**

**Brac University**

**Examination: Quiz 4** **Semester: Fall 2025**

**Duration: 25 Minutes** **Full Marks: 15**

Name: ID:

Section:

**Answer all the questions.**

**a.** To adopt the utility of 13 I/Os, estimate the minimum number of secondary/2nd-level 8237 DMA controllers needed. **[2]**

| Ans. 3 |
|---|

**b. Illustrate** the DMA cascading **diagram** based on your answer in (a). Your diagram should show how the secondary controllers/ 2nd level are connected with the primary controller/1st level using the appropriate pins. **[4]**

**c.** Write down the values of the given pins of an 8237 DMA Controller during a DMA read cycle: **i. IOR' ii. IOW' iii. MEMW' iv. MEMR'** **[2]**

| | | | |
|---|---|---|---|
| 1 | 0 | 1 | 0 |

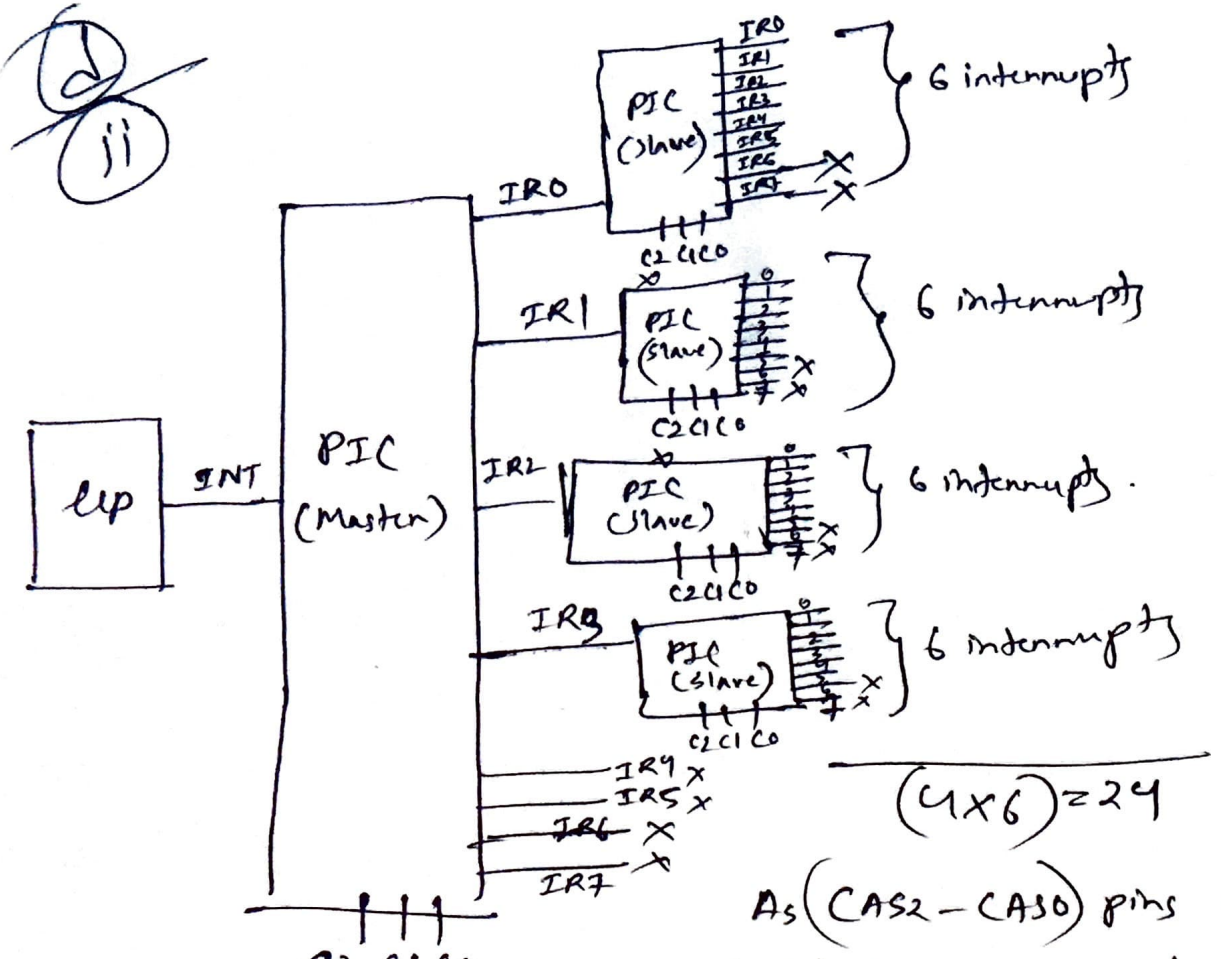
**d.** Assume you have several faulty 8259 PICs where the **IR6** and **IR7** pins do not work, and **CAS2** is always giving a **low (0)** signal.

**i.** In this scenario what will be the maximum number of interrupts that can be serviced through these faulty PICs at 1st-level cascading? **[2]**

| Ans. 24 |
|---|

**ii.** For a particular project, your microprocessor needs to provide service to 18 interrupts coming from I/O devices. If you use the same faulty PICs mentioned above then explain **how many** slave PICs will be required? Also using the proper diagram **illustrate** how the master and slave PICs will be connected with each other. **[1+4]**

d) ii)




| C2 | C1 | C0 |
|---|---|---|
| 0 | 0 | 0 |
| 0 | 0 | 1 |
| 0 | 1 | 0 |
| 0 | 1 | 1 |
| 1 | 0 | 0 |
| 1 | 0 | 1 |
| 1 | 1 | 0 |
| 0 | 1 | 1 |

Slave

So, only IR0-IR3 of Master will be available to address slaves

$(4 \times 6) = 24$

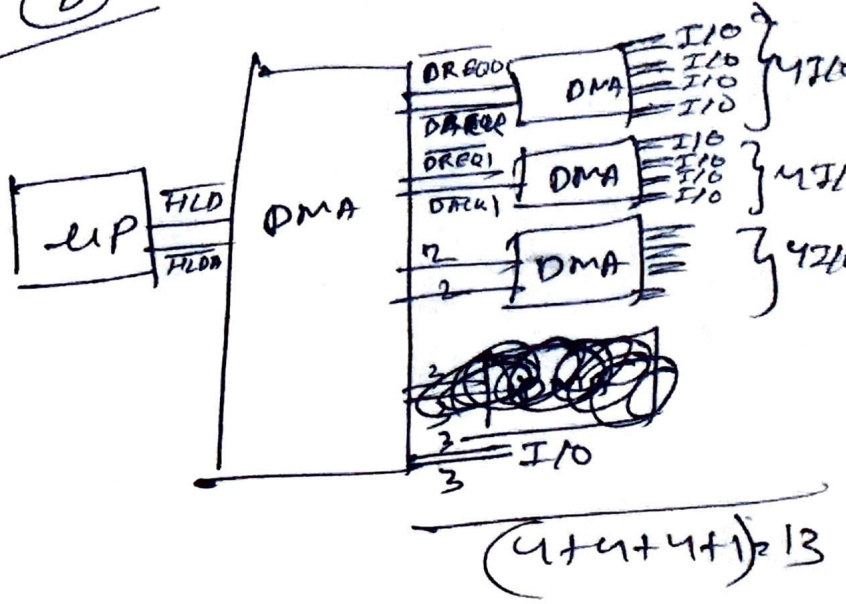
As (CAS2 – CAS0) pins are used to address slaves / slave PICs and second level cascading

2nd level cascading is not possible

So, IR4, IR5 pins will simply pass interrupt signals to Master PIC.

And using the faulty PICs, to service 18 interrupt we will need ~~4 Slave~~ 3 slave PICs. [just draw 3 slave PICs in the diagram]

b)




$(4+4+4+1) = 13$