# 18EC35-COA IAT2 Scheme and Solution, Jan 2022

1. Consider a database of marks scored by students in 3 tests, stored in memory starting at address LIST. Each student record consists of student ID followed by marks in 3 tests. Assume each of these to be 4 bytes in size. There are 50 students in the class and this value is stored at location NUM. Sketch the memory map showing all details. Develop an ALP using Indexed Addressing mode, to compute the sum of scores by all the students in Test2 and store the result in location SUM. Write appropriate comments.(10)

Memory map-3 M

Program with comments-8 M
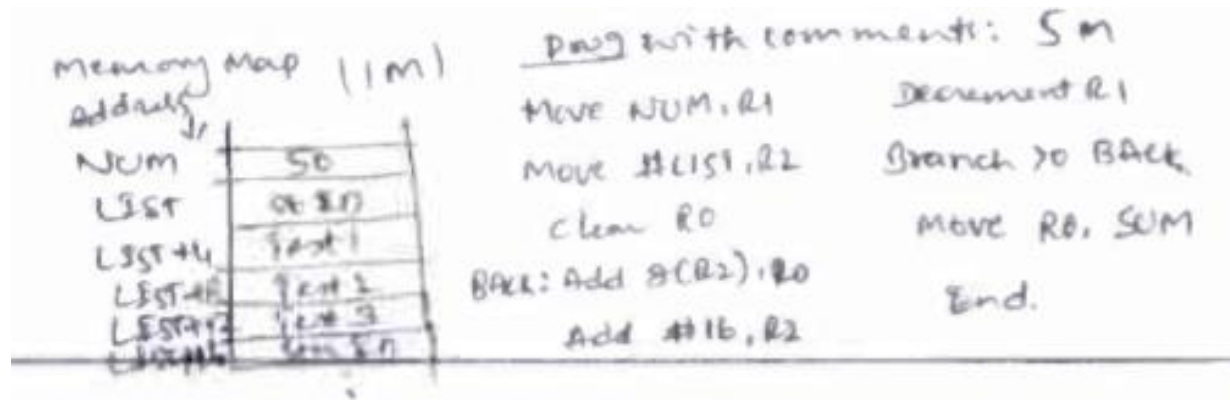
2. Write an ALP to add 'n' numbers using Indirect Addressing Mode with appropriate comments.

ALP- 5 M

Comments-5 M

Address	Contents		
	Move	N,R1	Initialization
	Move	#NUM1,R2	
	Clear	R0	
LOOP	Add	(R2),R0	
	Add	#4,R2	
	Decrement	R1	
	Branch>0	LOOP	
	Move	R0,SUM	

Figure 2.12   Use of indirect addressing in the program of Figure 2.10.

3. Illustrate DMA with registers involved in its interface.

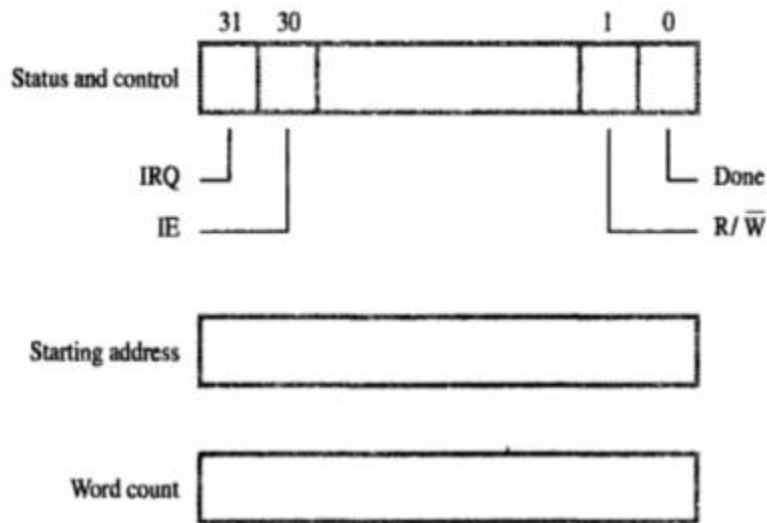Diagram and Registers-5 M

Explanation-5 M

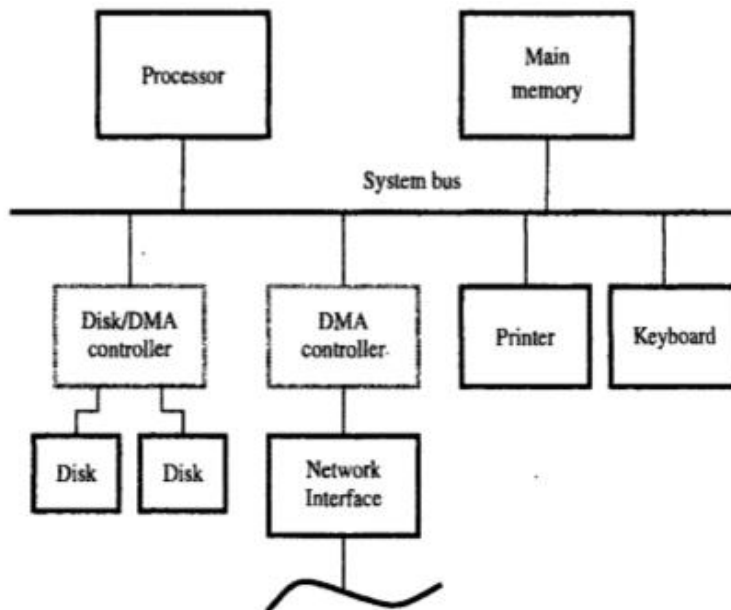**Figure 4.18** Registers in a DMA interface.

Figure 4.19 Use of DMA controllers in a computer system.

4. Consider a register R1 to size 16 bits with initial data 5867d. With neat sketches, depict the output in each case, after performing the following operations: (i)LShiftL #2, R1 (ii) AShiftR #1, R1 (iii) RotateR #1, R1 Note: For each operation, R1 value is to be taken as 5867d and carry flag is indicated cleared.

First convert the given decimal to binary. 1 M

With neat sketches, demonstrate the shifts and rotations. 9 M(3 marks each)

5. With a neat diagram, discuss implementation of interrupt priority using individual request and acknowledgement lines.
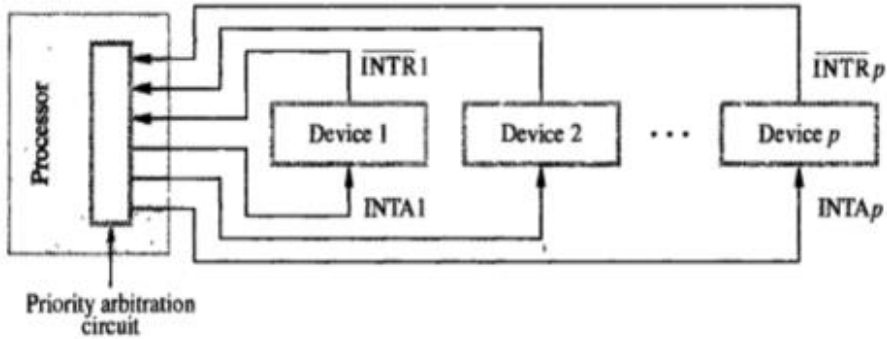
Diagram-3 M

Explanation-7 M

Figure 4.7 Implementation of interrupt priority using individual interrupt-request and acknowledge lines.

6. What is an Interrupt? With an example, illustrate the concept of interrupt.
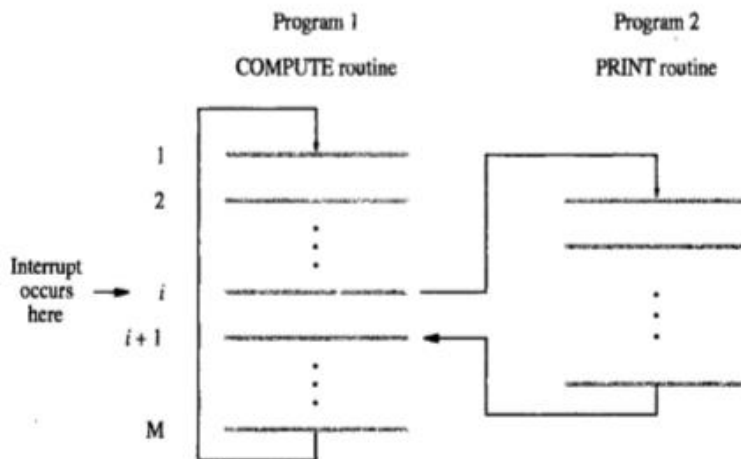
DIagram-2 M

Explanation-8 M

Figure 4.5 Transfer of control through the use of interrupts.

7.a. What is Subroutine? With a pseudocode or program segment, illustrate parameter passing using registers.

Code- 5 M

Explanation-5 M

Calling program

```
Move    N, R1              R1 serves as a counter
Move    #NUM1, R2          R2 points to the list
Call    LISTADD            Call subroutine
Move    R0, SUM            Save result
        ●
        ●
        ●
```

Subroutine

```
LISTADD   Clear        R0              Initialize sum to 0



LOOP      Add          (R2)+, R0    Add entry from list
          Decrement    R1
          Branch > 0   LOOP
          Return                     Return to calling program
```
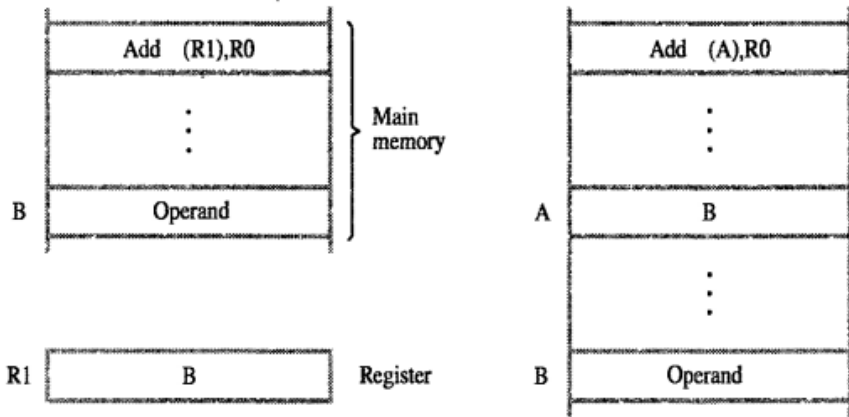
Fig 2.7: Program written as a subroutine; parameters passed through registers

7. b. Explain Indirect and Indexed Addressing Modes with suitable examples.

Example code for each-5 M

Explanation- 5 M

a) Through a general purpose register   b) Through a memory location
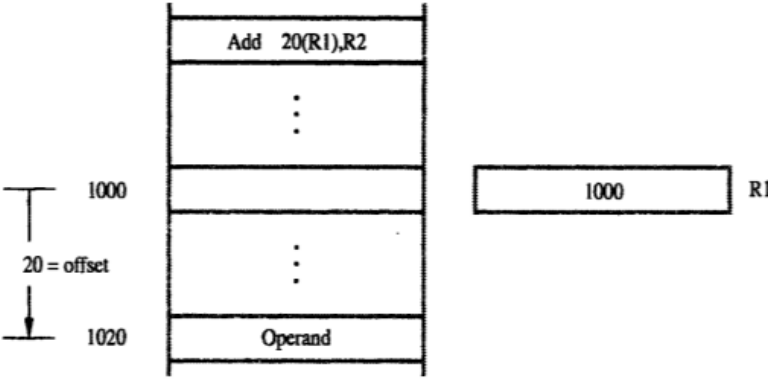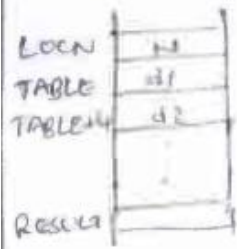
Fig 2.1: Indirect addressing

Fig 2.2 a: Offset is given as a constant

8. Consider a set of numbers(each 4 bytes in size) stored in memory starting at address TABLE. Total numbers are N and this value is stored at location LOCN. Sketch the memory map showing all details. Develop an ALP using Auto-increment addressing mode, to compute the sum of all numbers and store the result at memory address RESULT. Write appropriate comments.

Code-5 M

Explanation/comments-5 M

Auto-increment & Auto-decrement A.M.   2M

mem. map (1M)   prog. with comments (5M)

LOCN	N
TABLE	d1
TABLE+4	d2
	⋮
RESULT	

```
        move LOCN, R1
        move #TABLE, R2
        clear R0
UP:     Add (R2)+, R0
        Decrement R1
        Branch>0 UP
        move R0, RESULT
        End.
```