
**SLIATE**
**SRI LANKA INSTITUTE OF ADVANCED TECHNOLOGICAL EDUCATION**

(Established in the Ministry of Higher Education, vide in Act No. 29 of 1995)

**Higher National Diploma in Information Technology**
**2<sup>nd</sup> Year, Second Semester Examination – 2018**
**HNDIT2401-Computer Architecture**

Instructions for Candidates:

 Answer any **FOUR** Questions **ONLY**.

No. of questions : 05

No. of pages : 03

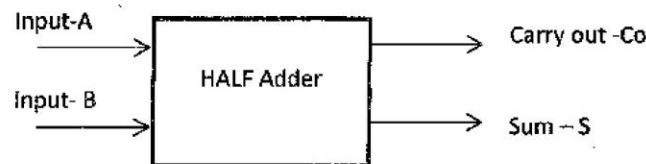
Time : 02 Hours

**Question 01**
**[Total 25 Marks]**

1. "There are two types of circuit. One is the input values which explicitly determine the output and the other one is the output which depends on the input values as well as the existing state of the circuit" State two general categories of circuits.

(2 Marks)

2. Consider the **Half Adder** to answer the following questions.



- a. Create the truth table from the above Half Adder.
- b. Construct a circuit diagram with minimum number of gates.

(4 Marks)

3. Draw the circuit diagram for the following Boolean expression by only using **NAND** gates.

$$F(A, B) = AB + AB'$$

(5 Marks)

4. Simplify the following Boolean expression using Boolean algebra and its identities.

$$a. F(A, B) = A'B + AB' + (AB)'$$

$$b. F(A, B, C) = A'B + ABC' + ABC$$

(6 Marks)

5. Simplify the function  $F(A, B, C) = A'B'C' + AB'C + A'BC' + AB'C' + ABC'$  using K-Maps.

(8 Marks)

PERMANENTLY DESTROYED ONLY

**Question 02****[Total 25 Marks]**

1. Briefly explain ALU. (2 Marks)
2. State 4 Registers which are inside the CPU. (4 Marks)
3. "The IAS operates by repetitively performing an instruction cycle, each instruction cycle consists of two sub cycles Fetch cycle and Execute cycle. Fetch cycle involves with different registers"  
Describe the fetch cycle and mention the registers involved in cycle. (5 Marks)
4. What are the three types of pipelining hazards? Briefly explain them. (6 Marks)
5. To deal with branches and reduce the branch penalty in pipelining there are several ways. Briefly describe 4 of them. (8 Marks)

**Question 03****[Total 25 Marks]**

1. Briefly explain the function of cache memory? (2 Marks)
2. "Programs tend to reuse data and instructions used recently, or recently referenced by them." Briefly describe two types of locality. (4 Marks)
3. What is nonvolatile memory? Give three examples. (5 Marks)
4. Describe the terms **Seek Time**, **Rotational Latency** and **Transfer Time** in hard disk operation. (6 Marks)
5. Answer the questions based on following details of a hard disk.  
512 bytes per sector  
300 sectors per track (on average)  
20000 tracks per surface  
Disk has 4 platters  
2 surfaces on each platter  
Disk rotation speed is 7600 rpm  
Average seek time is 9ms
  - a. Calculate the capacity of the hard disk
  - b. Calculate the transfer time.
  - c. Calculate the rotational latency.
  - d. Calculate the access time.(8 Marks)

**Question 04****[Total 25 Marks]**

1. State two techniques for Input Output operations. (2 Marks)
2. Give 4 major functions of I/O module. (4 Marks)
3. Differentiate Preemptive and Non-preemptive scheduling in CPU scheduling. (4 Marks)
4. State 5 criteria that can be used for performance evaluation of a scheduling algorithm. (5 Marks)
5. The following table shows the processes, arrival times and the service required time. These processes are handled under **preemptive shortest job first** algorithm with quantum time one second.

Process	Arrival Time (seconds)	service Time (seconds)
P1	2	6
P2	5	2
P3	1	8
P4	0	3
P5	4	4

- a. Draw Gantt chart for the above process scheduling.
- b. "Waiting time is the time interval for which one has to wait after placing a request for a service and before the service actually occurs". Calculate the waiting time of each process.
- c. Calculate the average waiting time.

(10 Marks)

**Question 05****[Total 25 Marks]**

1. Define clock rate(R) by using clock cycle time (T). (2 Marks)
2. Find the CPU execution time of the following program (4 Marks)  
Number of instructions in program (I) =300  
Average cycles per instruction (CPI) =3  
Clock rate=4GHz
3. Define the term, '**deadlock**' using an example. (5 Marks)
4. Briefly describe three general strategies to handle deadlock. (6 Marks)
5. Computing Systems are classified into four major categories in **Flynn's Taxonomy**. Briefly describe them. (8 Marks)

