Session 2: Homework Solution

1.CPU Execution Time = CPI * Clock Cycle * ----------

a. **Number of instructions**
b. access time
c. Fetch Cycle
d. Program

2. Unit Exa is equivalent to

a. 2^8
b. 2^20
c. 10^15
d. **10^18**

3. Clock cycles Per Instruction is

a. Total clock cycles per instruction for a program.
b. Average number of clock cycles in a program.
c. Frequency of the processor
d. **Average number of clock cycles per instruction for a program.**

4. Rotational latency (Tavg rotation) is defined as

a. Time to position heads over cylinder containing target sector.
b. **Time waiting for first bit of target sector to pass under r/w head**
c. Time to read the bits in the target sector.
d. Latent energy of rotation.

5. A program is running on a specific machine with 10,000,000 total Instruction count, average CPI is 1.5 cycles/instruction with clock rate 200 MHz. Calculate the execution time

a. b. 0.03 sec
b. **0.075 sec**
c. c. 0.5 sec
d. d. 0.02 sec

Key: Clock Cycle = 1/frequency = 1/200 MHz = $1/(200*10^{6})$
CPU Execution Time = CPI * No. of instructions * Clock Cycle
= $1.5 * 10,000,000/200 * 10^{6}$
= 0.075 Sec

6. A _____ is the smallest unit of information that can be read from or written to the disk

a. Spindle
b. Platter

c. Sector
d. Track

7. Number of tasks completed per unit time is

a. Throughput
b. Efficiency
c. Clock cycle
d. Execution time

8. Consider a disk with a sector size of 512 bytes, 4000 tracks per surface, 30 sectors per track, five double-sided platters. Calculate disk capacity

a. 500,000 K
b. 614,400 K
c. 682,000 K
d. 512,000 K

Key: Disk capacity = No. of platters * No. of sides per Platter * No. of tracks per surface * No. of sectors per track * No. of bytes per sector

= 5 * 2 * 4000 * 30 * 512

= 61,44,00,000 = **614,400 K**

9. Which main memory type is used in Computer Systems?

a. SRAM
b. Flash memory
c. EEPROM
d. DRAM

10. Which is the fastest storage unit in a usual memory hierarchy?d None of the answers is correct

a. Register
b. Hard disk
c. Main memory
d. Pen Drive

11. Mapping between logical blocks and actual sectors is maintained by hardware/firmware device called

a. Disk manager
b. disk controller
c. Memory Buffers
d. logical controller

12. A platter in a Hard Disk is rotating at 12000 RPM(Revolutions Per Minute). What is the time for 1 revolution in mill seconds?

a. 4
b. 6
c. 4.5
d. 5

Key: 12000 RPM means, in 60 seconds 12000 revolution.
Per second revolutions =12000/60 =200 rev
so time period for each revolution= 1/200 seconds = 0.005 Seconds.
There are 1000 millisecond in a second so time for one revolution =1000*0.005second = **5milli second**

13. The platter rotates at 9000RPM. What is the time for 1 revolution in microseconds

a. 6666.67
b. 6666.11
c. 6.66667
d. 0.0066667

Key: 9000 RPM means in 60 seconds 9000 revolution.
Per second revolutions=9000/60=150 rev.
so time period for each revolution= 1/150 seconds=0.0066667 Seconds.
There are 1000,000 microsecond in a second so time for one revolution =1000,000*0.00666667second = **6666.67micro second**

14. What is the unit for AREAL density?

a. tracks/square inch
b. bits/inch
c. bits/square inch
d. tracks/inch

Key: The Areal density is computed per inch bits on a track and the radial track per inch product which is bits/square inch

15. Speedup by 5 is achieved for 90% of a program by making the computer run faster by

a. 9.26 times
b. 8.66 times
c. 4.98
d. 9.0

Key: using expression "s=1/((1-f)+(f/k))" and re-writing it as " s(1-f)+s(f/k)=1"
solving for k by replacing s=5,f=0.9 the result is **9**.