1. A file system uses a two-level indexed allocation scheme. If the size of each block is 1KB, and each block address takes 4 bytes, then the maximum length of a file that this system can support is approximately ____ .

A. 16MB
B. 64MB
C. 128MB
D. 256MB

2. Operating systems use a structure called FCB (File Control Block) to manage files. The FCB is created when the system call to _____ is executed.

A. close a file
B. create a file
C. read within a file
D. write into a file

3. The CPU gets rid of involving in the data exchange between the I/O device and the storage device by means of _____.

A. polling
B. interrupt
C. DMA
D. unconditional access methods

4. Assume a Unix system with three users named user1, user2, and user3, and three groups named group1, group2, and group3. Assume group1 has members (user1, user2), group2 has members (user2, user3), and group3 has members (user3, user1). Consider three files with the following permissions: [9 points]

rw-rw---- user1 group1 file1
rw-r--r-- user2 group3 file2
rwxr----- user3 group2 file3

1) Which files can user1 read? Which files can user2 write? Which users can read file3? [3 points]

2) User2 cannot execute file3. What permissions does file3 need so that all of its previous permissions are retained and user2 can further execute this file? [2 points]

3) (c) Explain the ACL mechanism to protect files, and advantages and disadvantages of ACL comparing to the Unix file protection (at least one advantage and one disadvantage). [2 points]

4) Assume the system has another user User4 besides user1, user2 and user3. If we want to user1 can read, write and execute file3, user2 can only read file3, user3 can read write and execute file3, and user4 can read and write file3. Besides, we cannot change the owner and group owner of file3. Can this requirement be satisfied by changing the permission bits of file3 and/or group members of group 2? If can, explain the detailed way. If cannot, how can we achieve this requirement? [2 points]

5. File system. [11 points]

1) A Unix i-node has 12 disk addresses for direct disk blocks and three addresses for single, double, and triple indirect blocks. If each indirect block contains 512 disk addresses, and assume disk blocks of 8KB, what is the maximum file size supported by this system? Please explain your answer in detail.

2) Assume that you are user1 in a Unix file system and that you need to read the file /home/user1/test/test1.html which is stored in 2 disk blocks. Further assume that the / directory i-node is kept memory and each i-node and directory file fits in one disk block. How many disk accesses are required to read test1.html? Explain your answer. Use a table of the access to each inode/data block would help (as shown in the class)

3) Assume that user1 wants to read /home/user1/test/test2.html immediately after reading /home/user1/test/test1.html. Further assume that file test2.html is stored in 8 disk blocks. We also assume that the previously read block is loaded into memory (and still in the memory). How many disk accesses are required to read test2.html? Explain your answer.