File Systems and their Implementation

1. _____ is a unique tag, usually a number identifies the file within the file system.
a) File identifier
b) File name
c) File type
d) None of the mentioned
View Answer
2. To create a file _____
a) allocate the space in file system
b) make an entry for new file in directory
c) allocate the space in file system & make an entry for new file in directory
d) none of the mentioned
View Answer
3. By using the specific system call, we can _____
a) open the file
b) read the file
c) write into the file
d) all of the mentioned

4. File type can be represented by _____
a) file name
b) file extension
c) file identifier
d) none of the mentioned
View Answer
5. Which file is a sequence of bytes organized into blocks understandable by the system's linker?
a) object file
b) source file
c) executable file
d) text file

6. What is the mounting of file system?
a) crating of a filesystem
b) deleting a filesystem
c) attaching portion of the file system into a directory structure
d) removing the portion of the file system into a directory structure
View Answer
7. Mapping of file is managed by _____
a) file metadata
b) page table
c) virtual memory
d) file system
View Answer

8. Mapping of network file system protocol to local file system is done by _____
a) network file system
b) local file system
c) volume manager
d) remote mirror
View Answer
9. Which one of the following explains the sequential file access method?
a) random access according to the given byte number
b) read bytes one at a time, in order
c) read/write sequentially by record
d) read/write randomly by record
View Answer
10. When will file system fragmentation occur?
a) unused space or single file are not contiguous
b) used space is not contiguous
c) unused space is non-contiguous
d) multiple files are non-contiguous

1. Management of metadata information is done by _____
a) file-organisation module
b) logical file system
c) basic file system
d) application programs
View Answer
2. A file control block contains the information about _____
a) file ownership
b) file permissions
c) location of file contents
d) all of the mentioned
View Answer
3. Which table contains the information about each mounted volume?
a) mount table
b) system-wide open-file table
c) per-process open-file table
d) all of the mentioned

4. To create a new file application program calls _____
a) basic file system
b) logical file system
c) file-organisation module
d) none of the mentioned
View Answer
5. What will happens when a process closes the file?
a) per-process table entry is not removed
b) system wide entry’s open count is decremented
c) all of the mentioned
d) none of the mentioned

6. What is raw disk?
a) disk without file system
b) empty disk
c) disk lacking logical file system
d) disk having file system
View Answer
7. The data structure used for file directory is called _____
a) mount table
b) hash table
c) file table
d) process table
View Answer
8. In which type of allocation method each file occupy a set of contiguous block on the disk?
a) contiguous allocation
b) dynamic-storage allocation
c) linked allocation
d) indexed allocation
View Answer
9. If the block of free-space list is free then bit will _____
a) 1
b) 0
c) any of 0 or 1
d) none of the mentioned
View Answer
10. Which protocol establishes the initial logical connection between a server and a client?
a) transmission control protocol
b) user datagram protocol
c) mount protocol
d) datagram congestion control protocol

1. Data cannot be written to secondary storage unless written within a _____
a) file
b) swap space
c) directory
d) text format
View Answer
2. File attributes consist of _____
a) name
b) type
c) identifier
d) all of the mentioned
View Answer
3. The information about all files is kept in _____
a) swap space
b) operating system
c) seperate directory structure
d) none of the mentioned

4. A file is a/an _____ data type.
a) abstract
b) primitive
c) public
d) private
View Answer
5. The operating system keeps a small table containing information about all open files called _____
a) system table
b) open-file table
c) file table
d) directory table

6. In UNIX, what will the open system call return?
a) pointer to the entry in the open file table
b) pointer to the entry in the system wide table
c) a file to the process calling it
d) none of the mentioned
View Answer
7. System wide table in UNIX contains process independent information such as _____
a) location of file on disk
b) access dates
c) file size
d) all of the mentioned
View Answer
8. The open file table has a/an _____ associated with each file.
a) file content
b) file permission
c) open count
d) close count
View Answer
9. Which of the following are the two parts of the file name?
a) name & identifier
b) identifier & type
c) extension & name
d) type & extension

1. The UNIX sytem uses a/an _____ stored at the beginning of a some files to indicate roughly the type of file.
a) identifier
b) extension
c) virtual number
d) magic number
View Answer
2. The larger the block size, the _____ the internal fragmentation.
a) greater

b) lesser
c) same
d) none of the mentioned
View Answer
3. In the sequential access method, information in the file is processed _____
a) one disk after the other, record access doesnt matter
b) one record after the other
c) one text document after the other
d) none of the mentioned

4. Sequential access method _____ on random access devices.
a) works well
b) doesnt work well
c) maybe works well and doesnt work well
d) none of the mentioned
View Answer
5. The direct access method is based on a _____ model of a file, as _____ allow random access to any file block.
a) magnetic tape, magnetic tapes
b) tape, tapes
c) disk, disks
d) all of the mentioned

6. For a direct access file _____
a) there are restrictions on the order of reading and writing
b) there are no restrictions on the order of reading and writing
c) access is restricted permission wise
d) access is not restricted permission wise
View Answer
7. A relative block number is an index relative to _____
a) the beginning of the file
b) the end of the file
c) the last written position in file
d) none of the mentioned
View Answer
8. The index contains _____
a) names of all contents of file
b) pointers to each page
c) pointers to the various blocks
d) all of the mentioned
View Answer
9. For large files, when the index itself becomes too large to be kept in memory?
a) index is called
b) an index is created for the index file
c) secondary index files are created
d) all of the mentioned

1. To organise file systems on disk _____
a) they are split into one or more partitions
b) information about files is added to each partition
c) they are made on different storage spaces
d) all of the mentioned
View Answer
2. The directory can be viewed as a _____ that translates file names into their directory entries.
a) symbol table
b) partition
c) swap space
d) cache
View Answer
3. What will happen in the single level directory?
a) All files are contained in different directories all at the same level
b) All files are contained in the same directory
c) Depends on the operating system
d) None of the mentioned

4. What will happen in the single level directory?
a) all directories must have unique names
b) all files must have unique names
c) all files must have unique owners
d) all of the mentioned
View Answer
5. What will happen in the two level directory structure?
a) each user has his/her own user file directory
b) the system doesn’t its own master file directory
c) all of the mentioned
d) none of the mentioned

6. When a user job starts in a two level directory system, or a user logs in _____
a) the users user file directory is searched
b) the system’s master file directory is not searched
c) the master file directory is indexed by user name or account number, and each entry points to the UFD for that user
d) all of the mentioned
View Answer
7. When a user refers to a particular file?
a) system MFD is searched
b) his own UFD is not searched
c) both MFD and UFD are searched
d) every directory is searched

8. What is the disadvantage of the two level directory structure?
a) it does not solve the name collision problem
b) it solves the name collision problem

c) it does not isolate users from one another
d) it isolates users from one another
View Answer
9. In the tree structured directories _____
a) the tree has the stem directory
b) the tree has the leaf directory
c) the tree has the root directory
d) all of the mentioned
View Answer
10. The current directory contains, most of the files that are _____
a) of current interest to the user
b) stored currently in the system
c) not used in the system
d) not of current interest to the system
View Answer
11. Which of the following are the types of Path names?
a) absolute & relative
b) local & global
c) global & relative
d) relative & local

1. An absolute path name begins at the _____
a) leaf
b) stem
c) current directory
d) root
View Answer
2. A relative path name begins at the _____
a) leaf
b) stem
c) current directory
d) root
View Answer
3. In a tree structure, when deleting a directory that is not empty?
a) The contents of the directory are safe
b) The contents of the directory are also deleted
c) contents of the directory are not deleted
d) none of the mentioned

4. When two users keep a subdirectory in their own directories, the structure being referred to is _____
a) tree structure
b) cyclic graph directory structure
c) two level directory structure
d) acyclic graph directory

5. A tree structure _____ the sharing of files and directories.
a) allows
b) may restrict
c) restricts
d) none of the mentioned

6. With a shared file _____
a) actual file exists
b) there are two copies of the file
c) the changes made by one person are not reflected to the other
d) the changes made by one person are reflected to the other
View Answer
7. In UNIX, what is a link?
a) a directory entry
b) a pointer to another file or subdirectory
c) implemented as an absolute or relative path name
d) all of the mentioned
View Answer
8. The operating system _____ the links when traversing directory trees, to preserve the acyclic structure of the system.
a) considers
b) ignores
c) deletes
d) none of the mentioned
View Answer
9. The deletion of a link _____ the original file.
a) deletes
b) affects
c) does not affect
d) none of the mentioned
View Answer
10. When keeping a list of all the links/references to a file, and the list is empty, implies that _____
a) the file has no copies
b) the file is deleted
c) the file is hidden
d) none of the mentioned

11. When a cycle exists, the reference count maybe non zero, even when it is no longer possible to refer to a directory or file, due to _____
a) the possibility of one hidden reference
b) the possibility of two hidden references
c) the possibility of self referencing
d) none of the mentioned

1. What is the mount point?
a) an empty directory at which the mounted file system will be attached

b) a location where every time file systems are mounted
c) is the time when the mounting is done
d) none of the mentioned
View Answer
2. When a file system is mounted over a directory that is not empty then _____
a) the system may not allow the mount
b) the system must allow the mount
c) the system may allow the mount and the directory's existing files will then be made obscure
d) all of the mentioned
View Answer
3. In UNIX, exactly which operations can be executed by group members and other users is definable by _____
a) the group's head
b) the file's owner
c) the file's permissions
d) all of the mentioned

4. A process _____ lower the priority of another process if both are owned by the same owner.
a) must
b) can
c) cannot
d) none of the mentioned
View Answer
5. In distributed file system _____ directories are visible from the local machine.
a) protected
b) local
c) private
d) remote

6. In the world wide web, a ____ is needed to gain access to the remote files, and separate operations are used to transfer files.
a) laptop
b) plugin
c) browser
d) player
View Answer
7. Anonymous access allows a user to transfer files _____
a) without having an account on the remote system
b) only if he accesses the system with a guest account
c) only if he has an account on the remote system
d) none of the mentioned
View Answer
8. The machine containing the files is the _____ and the machine wanting to access the files is the _____

a) master, slave
b) memory, user
c) server, client
d) none of the mentioned
View Answer
9. Distributed naming services/Distributed information systems have been devised to _____
a) provide information about all the systems
b) provide unified access to the information needed for remote computing
c) provide unique names to all systems in a network
d) all of the mentioned
View Answer
10. Domain name system provides _____
a) host-name-to-network-address translations for the entire internet
b) network-address-to-host-name translations for the entire internet
c) binary to hex translations for the entire internet
d) all of the mentioned
View Answer
11. To recover from failures in the network operations _____ information may be maintained.
a) ip address
b) state
c) stateless
d) operating system
View Answer
12. The series of accesses between the open and close operations is a _____
a) transaction
b) procedure
c) program
d) file session

1. Reliability of files can be increased by _____
a) keeping the files safely in the memory
b) making a different partition for the files
c) by keeping them in external storage
d) by keeping duplicate copies of the file
View Answer
2. Protection is only provided at the _____ level.
a) lower
b) central
c) higher
d) none of the mentioned
View Answer
3. What is the main problem with access control lists?
a) their maintenance
b) their length

c) their permissions
d) all of the mentioned

4. Many systems recognize three classifications of users in connection with each file (to condense the access control list).
a) Owner
b) Group
c) Universe
d) All of the mentioned
View Answer
5. All users in a group get _____ access to a file.
a) different
b) similar
c) same
d) none of the mentioned

6. Universe consists of _____
a) all users that aren't included in the group or owners
b) all users that are not owners
c) all users in the system
d) none of the mentioned
View Answer
7. In UNIX, groups can be created and modified by?
a) superuser
b) any user
c) a programmer only
d) the people in the group only
View Answer
8. To control access the three bits used in UNIX are represented by _____
a) r
b) w
c) x
d) all of the mentioned
View Answer
9. If each access to a file is controlled by a password, then what is the disadvantage?
a) user will need to remember a lot of passwords
b) it is not reliable
c) it is not efficient
d) all of the mentioned
View Answer
10. What will happen in a multi level directory structure?
a) the same previous techniques will be used as in the other structures
b) a mechanism for directory protection will have to applied
c) the subdirectories do not need protection once the directory is protected
d) none of the mentioned
View Answer

11. In UNIX, the directory protection is handled _____ to the file protection.
a) different
b) similar
c) it is not handled at all
d) none of the mentioned
View Answer
12. Disks are segmented into one or more partitions, each containing a file system or _____
a) left ‘raw’
b) made into swap space
c) made into backup space
d) left ‘ripe’

1. The three major methods of allocating disk space that are in wide use are _____
a) contiguous
b) linked
c) indexed
d) all of the mentioned
View Answer
2. In contiguous allocation _____
a) each file must occupy a set of contiguous blocks on the disk
b) each file is a linked list of disk blocks
c) all the pointers to scattered blocks are placed together in one location
d) none of the mentioned
View Answer
3. In linked allocation _____
a) each file must occupy a set of contiguous blocks on the disk
b) each file is a linked list of disk blocks
c) all the pointers to scattered blocks are placed together in one location
d) none of the mentioned

4. In indexed allocation _____
a) each file must occupy a set of contiguous blocks on the disk
b) each file is a linked list of disk blocks
c) all the pointers to scattered blocks are placed together in one location
d) none of the mentioned
View Answer
5. On systems where there are multiple operating system, the decision to load a particular one is done by _____
a) boot loader
b) bootstrap
c) process control block
d) file control block

6. The VFS (virtual file system) activates file system specific operations to handle local requests according to their _____

a) size
b) commands
c) timings
d) file system types
View Answer
7. What is the real disadvantage of a linear list of directory entries?
a) size of the linear list in memory
b) linear search to find a file
c) it is not reliable
d) all of the mentioned

8. Contiguous allocation of a file is defined by _____
a) disk address of the first block & length
b) length & size of the block
c) size of the block
d) total size of the file
View Answer
9. One difficulty of contiguous allocation is _____
a) finding space for a new file
b) inefficient
c) costly
d) time taking
View Answer
10. _____ and _____ are the most common strategies used to select a free hole from the set of available holes.
a) First fit, Best fit
b) Worst fit, First fit
c) Best fit, Worst fit
d) None of the mentioned

11. The first fit and best fit algorithms suffer from _____
a) internal fragmentation
b) external fragmentation
c) starvation
d) all of the mentioned
View Answer
12. To solve the problem of external fragmentation _____ needs to be done periodically.
a) compaction
b) check
c) formatting
d) replacing memory
View Answer
13. If too little space is allocated to a file _____
a) the file will not work
b) there will not be any space for the data, as the FCB takes it all
c) the file cannot be extended
d) the file cannot be opened

1. A device driver can be thought of like a translator. Its input consists of _____ commands and output consists of _____ instructions.
a) high level, low level
b) low level, high level
c) complex, simple
d) low level, complex
View Answer
2. The file organization module knows about _____
a) files
b) logical blocks of files
c) physical blocks of files
d) all of the mentioned
View Answer
3. Metadata includes _____
a) all of the file system structure
b) contents of files
c) both file system structure and contents of files
d) none of the mentioned

4. For each file there exists a _____ that contains information about the file, including ownership, permissions and location of the file contents.
a) metadata
b) file control block
c) process control block
d) all of the mentioned
View Answer
5. For processes to request access to file contents, they need _____
a) to run a seperate program
b) special interrupts
c) to implement the open and close system calls
d) none of the mentioned

6. During compaction time, other normal system operations _____ be permitted.
a) can
b) cannot
c) is
d) none of the mentioned
View Answer
7. When in contiguous allocation the space cannot be extended easily?
a) the contents of the file have to be copied to a new space, a larger hole
b) the file gets destroyed
c) the file will get formatted and lost all its data
d) none of the mentioned
View Answer
8. In the linked allocation, the directory contains a pointer to which block?
I. first block
II. last block

a) I only
b) II only
c) Both I and II
d) Neither I nor II
View Answer
9. There is no _____ with linked allocation.
a) internal fragmentation
b) external fragmentation
c) starvation
d) all of the mentioned
View Answer
10. What is the major disadvantage with a linked allocation?
a) internal fragmentation
b) external fragmentation
c) there is no sequential access
d) there is only sequential access
View Answer
11. What if a pointer is lost or damaged in a linked allocation?
a) the entire file could get damaged
b) only a part of the file would be affected
c) there would not be any problems
d) none of the mentioned
View Answer
12. FAT stands for _____
a) File Attribute Transport
b) File Allocation Table
c) Fork At Time
d) None of the mentioned
View Answer
13. By using FAT, random access time is _____
a) the same
b) increased
c) decreased
d) not affected

1. A better way of contiguous allocation to extend the file size is _____
a) adding an extent (another chunk of contiguous space)
b) adding an index table to the first contiguous block
c) adding pointers into the first contiguous block
d) none of the mentioned
View Answer
2. If the extents are too large, then what is the problem that comes in?
a) internal fragmentation
b) external fragmentation
c) starvation
d) all of the mentioned
View Answer

3. The FAT is used much as a _____
a) stack
b) linked list
c) data
d) pointer

4. A section of disk at the beginning of each partition is set aside to contain the table in _____
a) fat
b) linked allocation
c) hashed allocation
d) indexed allocation
View Answer

5. Contiguous allocation has two problems _____ and _____ that linked allocation solves.
a) external – fragmentation & size – declaration
b) internal – fragmentation & external – fragmentation
c) size – declaration & internal – fragmentation
d) memory – allocation & size – declaration

6. Each _____ has its own index block.
a) partition
b) address
c) file
d) all of the mentioned
View Answer

7. Indexed allocation _____ direct access.
a) supports
b) does not support
c) is not related to
d) none of the mentioned
View Answer

8. The pointer overhead of indexed allocation is generally _____ the pointer overhead of linked allocation.
a) less than
b) equal to
c) greater than
d) keeps varying with
View Answer

9. For any type of access, contiguous allocation requires _____ access to get a disk block.
a) only one
b) at least two
c) exactly two
d) none of the mentioned
View Answer

10. Consider a disk where blocks 2, 3, 4, 5, 8, 9, 10, 11, 12, 13, 17, 18, 25, 26 and 27 are free and the rest of the blocks are allocated. Then the free space bitmap would be

_____
a) 10000110000001110011111100011111…
b) 11000011000000111001111100011111…
c) 01111001111110001100000011100000…
d) 00111100111111000110000011100000…

1. _____ tend to represent a major bottleneck in system performance.
a) CPUs
b) Disks
c) Programs
d) I/O
View Answer
2. In UNIX, even an ’empty’ disk has a percentage of its space lost to _____
a) programs
b) inodes
c) virtual memory
d) stacks
View Answer
3. By preallocating the inodes and spreading them across the volume, we _____ the system performance.
a) improve
b) decrease
c) maintain
d) do not affect

4. _____ writes occur in the order in which the disk subsystem receives them, and the writes are not buffered.
a) Asynchronous
b) Regular
c) Synchronous
d) Irregular
View Answer
5. In _____ writes, the data is stored in the cache.
a) Asynchronous
b) Regular
c) Synchronous
d) Irregular

6. A file being read or written sequentially should not have its pages replaced in LRU order, because _____
a) it is very costly
b) the most recently used page will be used last
c) it is not efficient
d) all of the mentioned
View Answer
7. In the optimized technique for sequential access _____ removes a page from the buffer as soon as the next page is requested.

a) write ahead
b) read ahead
c) free-behind
d) add-front

8. With _____ a requested page and several subsequent pages are read and cached.
a) write ahead
b) read ahead
c) free-behind
d) add-front

1. Some directory information is kept in main memory or cache to _____
a) fill up the cache
b) increase free space in secondary storage
c) decrease free space in secondary storage
d) speed up access
View Answer
2. A systems program such as fsck in _____ is a consistency checker.
a) UNIX
b) Windows
c) Macintosh
d) Solaris
View Answer
3. A consistency checker _____ and tries to fix any inconsistencies it finds.
a) compares the data in the secondary storage with the data in the cache
b) compares the data in the directory structure with the data blocks on disk
c) compares the system generated output and user required output
d) all of the mentioned

4. Each set of operations for performing a specific task is a _____
a) program
b) code
c) transaction
d) all of the mentioned
View Answer
5. Once the changes are written to the log, they are considered to be _____
a) committed
b) aborted
c) completed
d) none of the mentioned

6. When an entire committed transaction is completed, _____
a) it is stored in the memory
b) it is removed from the log file
c) it is redone
d) none of the mentioned
View Answer

7. What is a circular buffer?
a) writes to the end of its space and then continues at the beginning
b) overwrites older values as it goes
c) all of the mentioned
d) none of the mentioned
View Answer
8. All the changes that were done from a transaction that did not commit before the system crashed, have to be _____
a) saved
b) saved and the transaction redone
c) undone
d) none of the mentioned

1. A machine in Network file system (NFS) can be _____
a) client
b) server
c) both client and server
d) neither client nor server
View Answer
2. A _____ directory is mounted over a directory of a _____ file system.
a) local, remote
b) remote, local
c) local, local
d) none of the mentioned
View Answer
3. The _____ becomes the name of the root of the newly mounted directory.
a) root of the previous directory
b) local directory
c) remote directory itself
d) none of the mentioned

4. _____ mounts, is when a file system can be mounted over another file system, that is remotely mounted, not local.
a) recursive
b) cascading
c) trivial
d) none of the mentioned

5. The mount mechanism _____ a transitive property.
a) exhibits
b) does not exhibit
c) may exhibit
d) none of the mentioned

6. A mount operation includes the _____
a) name of the network
b) name of the remote directory to be mounted

c) name of the server machine storing it
d) all of the mentioned
View Answer
7. The mount request is mapped to the corresponding _____ and is forwarded to the mount server running on the specific server machine.
a) IPC
b) System
c) CPU
d) RPC
View Answer
8. The server maintains a/an _____ that specifies local file systems that it exports for mounting, along with names of machines that are permitted to mount them.
a) export list
b) import list
c) sending list
d) receiving list
View Answer
9. In UNIX, the file handle consists of a _____ and _____
a) file-system identifier & an inode number
b) an inode number & FAT
c) a FAT & an inode number
d) a file pointer & FAT

1. The NFS servers _____
a) are stateless
b) save the current state of the request
c) maybe stateless
d) none of the mentioned
View Answer
2. Every NFS request has a _____ allowing the server to determine if a request is duplicated or if any are missing.
a) name
b) transaction
c) sequence number
d) all of the mentioned
View Answer
3. A server crash and recovery will _____ to a client.
a) be visible
b) affect
c) be invisible
d) harm

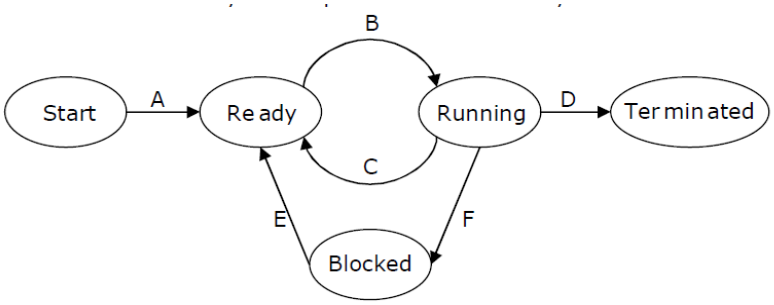
4. The server must write all NFS data _____
a) synchronously
b) asynchronously
c) index-wise

d) none of the mentioned
View Answer
5. A single NFS write procedure _____
a) can be atomic
b) is atomic
c) is non atomic
d) none of the mentioned

6. The NFS protocol _____ concurrency control mechanisms.
a) provides
b) does not provide
c) may provide
d) none of the mentioned
View Answer
7. _____ in NFS involves the parsing of a path name into separate directory entries – or components.
a) Path parse
b) Path name parse
c) Path name translation
d) Path name parsing
View Answer
8. For every pair of component and directory vnode after path name translation _____
a) a single NFS lookup call is used sequentially
b) a single NFS lookup call is used beginning from the last component
c) at least two NFS lookup calls per component are performed
d) a separate NFS lookup call is performed
View Answer
9. When a client has a cascading mount _____ server(s) is/are involved in a path name traversal.
a) at least one
b) more than one
c) more than two
d) more than three

OS GATE 9, 10, 11, 12

In the following process state transition diagram for a uniprocessor system, assume that there are always some processes in the ready state: Now consider the following statements:



I. If a process makes a transition D, it would result in another process making transition A immediately.
II. A process P2 in blocked state can make transition E while another process P1 is in running state.
III. The OS uses preemptive scheduling.
IV. The OS uses non-preemptive scheduling.
Which of the above statements are TRUE?
(A) I and II
(B) I and III
(C) II and III
(D) II and IV

2) The enter_CS() and leave_CS() functions to implement critical section of a process are realized using test-and-set instruction as follows:

```
void enter_CS(X)

{

   while test-and-set(X) ;

}

void leave_CS(X)

{

  X = 0;

}
```

In the above solution, X is a memory location associated with the CS and is initialized to 0. Now consider the following statements:
I. The above solution to CS problem is deadlock-free
II. The solution is starvation free.
III. The processes enter CS in FIFO order.
IV More than one process can enter CS at the same time.
Which of the above statements is TRUE?
(A) I only
(B) I and II
(C) II and III
(D) IV only

3) A multilevel page table is preferred in comparison to a single level page table for translating virtual address to physical address because
(A) It reduces the memory access time to read or write a memory location.
(B) It helps to reduce the size of page table needed to implement the virtual address space of a process.
(C) It is required by the translation lookaside buffer.
(D) It helps to reduce the number of page faults in page replacement algorithms.

1) The data blocks of a very large file in the Unix file system are allocated using
(A) contiguous allocation
(B) linked allocation
(C) indexed allocation
(D) an extension of indexed allocation

2) The P and V operations on counting semaphores, where s is a counting semaphore, are defined as follows:

```
P(s) : s =  s - 1;
  if (s  < 0) then wait;
V(s) : s = s + 1;
  if (s <= 0) then wakeup a process waiting on s;
```

Assume that Pb and Vb the wait and signal operations on binary semaphores are provided. Two binary semaphores Xb and Yb are used to implement the semaphore operations P(s) and V(s) as follows:

```
P(s) : Pb(Xb);
  s = s - 1;
  if (s < 0) {
   Vb(Xb) ;
   Pb(Yb) ;
  }
  else Vb(Xb);


V(s) : Pb(Xb) ;
  s = s + 1;
```

```
if (s <= 0) Vb(Yb) ;

Vb(Xb) ;
```

The initial values of Xb and Yb are respectively
(A) 0 and 0
(B) 0 and 1
(C) 1 and 0
(D) 1 and 1

1) A process executes the following code

```
for (i = 0; i < n; i++) fork();
```

The total number of child processes created is
(A) n
(B) 2^n - 1
(C) 2^n
(D) 2^(n+1) - 1;

3) A processor uses 36 bit physical addresses and 32 bit virtual addresses, with a page frame size of 4 Kbytes. Each page table entry is of size 4 bytes. A three level page table is used for virtual to physical address translation, where the virtual address is used as follows

- Bits 30-31 are used to index into the first level page table
- Bits 21-29 are used to index into the second level page table
- Bits 12-20 are used to index into the third level page table, and
- Bits 0-11 are used as offset within the page

The number of bits required for addressing the next level page table (or page frame) in the page table entry of the first, second and third level page tables are respectively
(A) 20, 20 and 20
(B) 24, 24 and 24
(C) 24, 24 and 20
(D) 25, 25 and 24

1) Consider a disk pack with 16 surfaces, 128 tracks per surface and 256 sectors per track. 512 bytes of data are stored in a bit serial manner in a sector. The capacity of the disk pack and the number of bits required to specify a particular sector in the disk are respectively:
(A) 256 Mbyte, 19 bits
(B) 256 Mbyte, 28 bits
(C) 512 Mbyte, 20 bits
(D) 64 Gbyte, 28 bits

2) Group 1 contains some CPU scheduling algorithms and Group 2 contains some applications. Match entries in Group 1 to entries in Group 2.

Group I	Group II
(P) Gang Scheduling	(1) Guaranteed Scheduling

(Q) Rate Monotonic Scheduling (2) Real-time Scheduling

(R) Fair Share Scheduling (3) Thread Scheduling

(A) P – 3 Q – 2 R – 1
(B) P – 1 Q – 2 R – 3
(C) P – 2 Q – 3 R – 1
(D) P – 1 Q – 3 R – 2

3) An operating system uses Shortest Remaining Time first (SRT) process scheduling algorithm. Consider the arrival times and execution times for the following processes:

Process	Execution time	Arrival time
P1	20	0
P2	25	15
P3	10	30
P4	15	45

What is the total waiting time for process P2?
(A) 5
(B) 15
(C) 40
(D) 55

1) A virtual memory system uses First In First Out (FIFO) page replacement policy and allocates a fixed number of frames to a process. Consider the following statements:
P: Increasing the number of page frames allocated to a process sometimes increases the page fault rate.
Q: Some programs do not exhibit locality of reference. Which one of the following is TRUE?
(A) Both P and Q are true, and Q is the reason for P
(B) Both P and Q are true, but Q is not the reason for P.
(C) P is false, but Q is true
(D) Both P and Q are false.

2) A single processor system has three resource types X, Y and Z, which are shared by three processes. There are 5 units of each resource type. Consider the following scenario, where the column alloc denotes the number of units of each resource type allocated to each process, and the column request denotes the number of units of each resource type requested by a process in order to complete execution. Which of these processes will finish LAST?

	alloc	request
	X Y Z	X Y Z
P0	1 2 1	1 0 3

P1 2 0 1 0 1 2

P2 2 2 1 1 2 0

(A) P0
(B) P1
(C) P2
(D) None of the above, since the system is in a deadlock

3) Two processes, P1 and P2, need to access a critical section of code. Consider the following synchronization construct used by the processes:Here, wants1 and wants2 are shared variables, which are initialized to false. Which one of the following statements is TRUE about the above construct?

```
 /* P1 */
while (true) {
  wants1 = true;
  while (wants2 == true);
  /* Critical
    Section */
  wants1=false;
}
/* Remainder section */



/* P2 */
while (true) {
  wants2 = true;
  while (wants1==true);
  /* Critical
    Section */
  wants2 = false;
}
/* Remainder section */
```

(A) It does not ensure mutual exclusion.
(B) It does not ensure bounded waiting.

(C) It requires that processes enter the critical section in strict alternation.
(D) It does not prevent deadlocks, but ensures mutual exclusion.

4) Consider the following statements about user level threads and kernel level threads. Which one of the following statement is FALSE?
(A) Context switch time is longer for kernel level threads than for user level threads.
(B) User level threads do not need any hardware support.
(C) Related kernel level threads can be scheduled on different processors in a multi-processor system.
(D) Blocking one kernel level thread blocks all related threads.

1) Consider three CPU-intensive processes, which require 10, 20 and 30 time units and arrive at times 0, 2 and 6, respectively. How many context switches are needed if the operating system implements a shortest remaining time first scheduling algorithm? Do not count the context switches at time zero and at the end.
(A) 1
(B) 2
(C) 3
(D) 4

2) A computer system supports 32-bit virtual addresses as well as 32-bit physical addresses. Since the virtual address space is of the same size as the physical address space, the operating system designers decide to get rid of the virtual memory entirely. Which one of the following is true?
(A) Efficient implementation of multi-user support is no longer possible
(B) The processor cache organization can be made more efficient now
(C) Hardware support for memory management is no longer needed
(D) CPU scheduling can be made more efficient now

3) A CPU generates 32-bit virtual addresses. The page size is 4 KB. The processor has a translation look-aside buffer (TLB) which can hold a total of 128 page table entries and is 4-way set associative. The minimum size of the TLB tag is:
(A) 11 bits
(B) 13 bits
(C) 15 bits
(D) 20 bits

1) Consider three processes (process id 0, 1, 2 respectively) with compute time bursts 2, 4 and 8 time units. All processes arrive at time zero. Consider the longest remaining time first (LRTF) scheduling algorithm. In LRTF ties are broken by giving priority to the process with the lowest process id. The average turn around time is:
(A) 13 units
(B) 14 units
(C) 15 units
(D) 16 units

2) Consider three processes, all arriving at time zero, with total execution time of 10, 20 and 30 units, respectively. Each process spends the first 20% of execution time doing I/O, the next 70% of time doing computation, and the last 10% of time doing I/O again. The operating system uses a shortest remaining

compute time first scheduling algorithm and schedules a new process either when the running process gets blocked on I/O or when the running process finishes its compute burst. Assume that all I/O operations can be overlapped as much as possible. For what percentage of time does the CPU remain idle?

(A) 0%
(B) 10.6%
(C) 30.0%
(D) 89.4%

3) The atomic fetch-and-set x, y instruction unconditionally sets the memory location x to 1 and fetches the old value of x in y without allowing any intervening access to the memory location x. consider the following implementation of P and V functions on a binary semaphore .

```
void P (binary_semaphore *s) {
  unsigned y;
  unsigned *x = &(s->value);
  do {
    fetch-and-set x, y;
  } while (y);
}

void V (binary_semaphore *s) {
  S->value = 0;
}
```

Which one of the following is true?
(A) The implementation may not work if context switching is disabled in P.
(B) Instead of using fetch-and-set, a pair of normal load/store can be used
(C) The implementation of V is wrong
(D) The code does not implement a binary semaphore

4) Consider the following snapshot of a system running n processes. Process i is holding Xi instances of a resource R, 1 <= i <= n. currently, all instances of R are occupied. Further, for all i, process i has placed a request for an additional Yi instances while holding the Xi instances it already has. There are exactly two processes p and q such that Yp = Yq = 0. Which one of the following can serve as a necessary condition to guarantee that the system is not approaching a deadlock?
(A) min (Xp, Xq) < max (Yk) where k != p and k != q (B) Xp + Xq >= min (Yk) where k != p and k != q
(C) max (Xp, Xq) > 1
(D) min (Xp, Xq) > 1