



INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad - 500 043

INFORMATION TECHNOLOGY

DEFINITIONS AND TERMINOLOGY

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| Course Name | . LINUX INTERNALS |
| Course Code | . AIT005 |
| Program | . B.Tech |
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| Branch | . INFORMATION TECHNOLOGY |
| Section | . A, B |
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OBJECTIVES.

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| I | To help students to consider in depth the terminology and nomenclature used in the syllabus. |
| II | To focus on the meaning of new words / terminology/nomenclature |

DEFINITIONS AND TERMINOLOGY QUESTION BANK

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| UNIT-I | | | | | | |
| 1 | What is Open source software? | Open Source Software is software for which the underlying programming code is available to the users so that they may read it, make changes to it, and build new versions of the software in incorporating their changes. There are many types of Open Source Software, mainly differing in the licensing term under which (altered) copies of the source code may (or must be) redistributed. | Remember | CO 1 | CLO 01 | AIT005.01 |
| 2 | What is the Need of Open Source Systems? | Need of Open Source Systems is <ul style="list-style-type: none"> • No initial cost • No licensing issues • Openness and Transparency • Speed of Access • Freedom of movement • Portable • Reliable • Stable • Security | Remember | CO 1 | CLO 01 | AIT005.01 |
| 3 | List the disadvantages of Linux? | Disadvantages of Linux are. <ul style="list-style-type: none"> • Learning • Lack of equivalent programs • More technical ability needed • Not all hardware compatible | Remember | CO 1 | CLO 01 | AIT005.01 |

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| 4 | What are the Process states? | <p>During the course of execution, processes change state. The state of a process is defined by its current activity. The different possible states of a process are the following</p> <ul style="list-style-type: none"> • In execution. the process is being executed by the processor, • Ready. the process could be executed, but another process is currently being executed, • Suspended. the process is waiting for a resource • Stopped. the process has been suspended by the external process • Zombie. the process has finished its execution but it is still referenced in the system | Remember | CO 1 | CLO 01 | AIT005.01 |
| 5 | What are the types of Process Identifiers? | <p>Types of Process Identifiers are.</p> <ul style="list-style-type: none"> • Identification of the real user • Identification of the effective user • Identification of the real group • Identification of the effective group • A list of group identifier | Remember | CO 1 | CLO 01 | AIT005.01 |
| 6 | What is CLI? | <p>CLI is short for Command Line Interface. This interface allows the user to type declarative commands to instruct the computer to perform operations. CLI offers greater flexibility. However, other users who are already accustomed to using GUI find it difficult to remember commands including attributes that come with it.</p> | Remember | CO 1 | CLO 01 | AIT005.01 |
| 7 | What are the kinds of permissions under Linux? | <p>There are 3 kinds of permissions under Linux.- Read. users may read the files or list the directory- Write. users may write to the file of new files to the directory- Execute. users may run the file or lookup a specific file within a directory</p> | Remember | CO 1 | CLO 02 | AIT005.02 |
| 8 | What is redirection? | <p>Redirection is the process of directing data from one output to another. It can also be used to direct an output as an input to another process.</p> | Remember | CO 1 | CLO 02 | AIT005.02 |
| 9 | What is grep command? | <p>grep a search command that makes use of pattern-based searching. It makes use of options and parameters that are specified along with the command line and applies this pattern in searching the required file output.</p> | Remember | CO 1 | CLO 02 | AIT005.02 |
| 10 | Write a command that will display all .txt files, including its individual permission. | <p>To display all .txt files, including its individual permission.</p> <pre>ls -al *.txt</pre> | Remember | CO 1 | CLO 02 | AIT005.02 |
| 11 | What are positional parameters? | <p>Positional parameters are the variables defined by a shell. And they are used whenever we need to convey information to the program. And this can be done by specifying arguments at the command line. There are totally 9 positional parameters</p> | Remember | CO 1 | CLO 02 | AIT005.02 |

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| | | present i.e. from \$1 to \$9. | | | | |
| 12 | How many shell scripts come with UNIX operating system? | There are approximately 280 shell scripts that come with the UNIX operating system. | Remember | CO 1 | CLO 03 | AIT005.03 |
| 13 | What are the three modes of operation of vi editor? Explain in brief. | The three modes of operation of vi editors are, (i) Command Mode . In this mode, all the keys pressed by a user are interpreted as editor commands. (ii) Insert Mode . This mode allows for insertion of a new text and editing of an existing text etc. (iii) The ex-command Mode . This mode allows a user to enter the commands at a command line. | Remember | CO 1 | CLO 03 | AIT005.03 |
| 14 | How will you check the length of a line from a text file using sed command? | To check the length of a line from a text file sed -n 'n p' file.txt wc -c | Remember | CO 1 | CLO 02 | AIT005.02 |
| 15 | Write a awk command to find the total number of lines in a file without using NR. | To find the total number of lines in a file awk 'BEGIN {sum=0} {sum=sum+1} END {print sum}' filename | Remember | CO 1 | CLO 02 | AIT005.02 |
| UNIT-II | | | | | | |
| 1 | What are the different blocks of a file system? | Different blocks of a file system . Super Block . This block mainly tells about a state of the file system like how big it is, maximum how many files can be accommodated etc. Boot Block . This represents the beginning of a file system. It contains bootstrap loader program, which gets executed when we boot the host machine. Inode Table . As we know all the entities in a UNIX are treated as files. So, the information related to these files are stored in an Inode table. Data Block . This block contains the actual file contents. | Remember | CO 2 | CLO 04 | AIT005.04 |
| 2 | List inode fields? | inode consists of the following fields. File owner identifier, File type, File access permissions, File access times, Number of links, File size Location of the file data | Remember | CO 2 | CLO 04 | AIT005.04 |
| 3 | What is sticky bit? | Sticky Bit is mainly used on folders in order to avoid deletion of a folder and it's content by other users though they having write permissions on the folder contents. If Sticky bit is enabled on a folder, the folder contents are deleted by only owner who created them and the root user. No one else can delete other users data in this folder (Where sticky bit is set). This is a security measure to avoid deletion of critical | Remember | CO 2 | CLO 04 | AIT005.04 |

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| | | folders and their content (sub-folders and files), though other users have full permissions. | | | | |
| 4 | Define device file? | Device file is a special file that is used to describe a physical device, such as a printer or a portable drive. | Remember | CO 2 | CLO 04 | AIT005.04 |
| 5 | Define system call? | A system call is the mechanism used by an application program to request service from the operating system. Operating systems contain sets of routines for performing various low-level operations. | Remember | CO 2 | CLO 04 | AIT005.04 |
| 6 | Illustrate different types of locks can apply on file. | File locking is a mutual-exclusion mechanism for files. Linux supports two major kinds of file locks. <ul style="list-style-type: none"> • advisory locks • mandatory locks | Remember | CO 2 | CLO 05 | AIT005.05 |
| 7 | Explain dup() Linux system call | The dup() system call creates a copy of a file descriptor. It uses the lowest-numbered unused descriptor for the new descriptor. If the copy is successfully created, then the original and copy file descriptors may be used interchangeably. | Remember | CO 2 | CLO 04 | AIT005.04 |
| 8 | Explain use of unlink system call? | To delete a link (a path) in a directory we can use the <i>unlink</i> system call. #include <unistd.h> <pre>int unlink(const char* path);</pre> The function returns 0 in case of success and -1 otherwise. The function decrements the hard link counter in the i-node and deletes the appropriate directory entry for the file whose link was deleted. If the number of links of a file becomes 0 then the space occupied by the file and its i-node will be freed. Only the root can delete a directory. | Remember | CO 2 | CLO 04 | AIT005.04 |
| 9 | How to change owner name and group name using system calls? | chown system call is used to modify the owner (UID) and the group (GID) that a certain file belongs to. The syntax of the function is. <pre>#include <sys/types.h> #include <unistd.h> int chown(const char* path, uid_t owner, gid_t grp);</pre> The function returns 0 in case of success and -1 in case of an error. Calling this function will change the owner and the group of the file specified by the argument <i>path</i> to the values specified by the arguments <i>owner</i> and <i>grp</i> . None of the users can change the owner of any file (even of his/her own files), except the root user, but they can change the GID for their own files to that of any group they belong to. | Remember | CO 2 | CLO 04 | AIT005.04 |
| 10 | Explain use of rewinddir system call? | The <i>rewinddir</i> function repositions the file pointer to the first directory entry (the beginning of the directory). | Remember | CO 2 | CLO 04 | AIT005.04 |

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| 11 | How to create file using system calls? | open and creat system calls are used to create new file. | Remember | CO 2 | CLO 04 | AIT005.04 |
| 12 | What is use of system function? | The C library function int system(const char *command) passes the command name or program name specified by command to the host environment to be executed by the command processor and returns after the command has been completed. <ul style="list-style-type: none"> • Declaration Following is the declaration for system() function. int system(const char *command) • Parameters • command – This is the C string containing the name of the requested variable. • Return Value The value returned is -1 on error, and the return status of the command otherwise. | Remember | CO 2 | CLO 04 | AIT005.04 |
| 13 | Define directory and filename? | A directory is a file that contains directory entries. The directory entry containing a file name along with structure of information describing the attributes of the file. The names in a directory are called filename. The only two characters that cannot appear in a file name are / and null character. | Remember | CO 2 | CLO 04 | AIT005.04 |
| UNIT-III | | | | | | |
| 1 | What is meant by Creating a Process? | Creating a process involves many operations including 1) Name the process 2) Insert it in the system's known processes list 3) Determine the process's initial priority 4) Create the process control block 5) Allocate the process's initial resources | Remember | CO 3 | CLO 07 | AIT005.07 |
| 2 | Define Mutual Exclusion. | It is defined as each process accessing the shared data excludes all others from doing simultaneously. | Remember | CO 3 | CLO 07 | AIT005.07 |
| 3 | What is a context switch? | Context switch means Kernel switches from executing one process to another. | Remember | CO 3 | CLO 07 | AIT005.07 |
| 4 | How do you get parent and current process identification number? | getppid() function used to get parent process. getpid() function used to display current process identification number. | Remember | CO 3 | CLO 07 | AIT005.07 |
| 5 | What are daemon processes? | Daemons are processes that are often started when the system is bootstrapped and terminate only when the system is shut down. | Remember | CO 3 | CLO 07 | AIT005.07 |
| 6 | Define zombie process? | Zombie process is a process which terminates before the parent process exit. | Remember | CO 3 | CLO 07 | AIT005.07 |
| 7 | How to terminate the process in linux system? | - a process can terminate itself using the exit system call. – a process can terminate a child using the kill system | Remember | CO 3 | CLO 07 | AIT005.07 |
| 8 | What is difference between process and threads? | Difference between process and thread. Process. Process is executing a program. But not all, it's only an instance of a computing program. Several processes may | Remember | CO 3 | CLO 08 | AIT005.08 |

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| | | be associated with the same program. Process contains program code and its current activity. Thread. thread is a light weight process. A thread of execution is the smallest sequence of programmed instructions that can be managed independently by scheduler. Threads reside inside the process. Each thread belongs to exactly one process. No thread exists outside the process. | | | | |
| 9 | Define deadlock | A deadlock is a situation in which two computer programs sharing the same resource are effectively preventing each other from accessing the resource, resulting in both programs ceasing to function | Remember | CO 3 | CLO 08 | AIT005.08 |
| 10 | What do you mean by signal? | Signals are software interrupts. Signals provide a way of handling asynchronous events. a user at a terminal typing the interrupt key to stop a program or the next program in the pipeline terminating prematurely. | Remember | CO 3 | CLO 09 | AIT005.09 |
| 11 | What is the purpose of exec functions? | When a process calls one of the exec functions that process is completely replaced by the new program. The new program starts execution from main function. The process does not change across an exec because a new process is not created. But this function replaces the current process with new program from disk. | Remember | CO 3 | CLO 09 | AIT005.09 |
| 12 | What is meant by Interrupt? | An Interrupt is an event that alters the sequence in which a processor executes instructions. It is generated by the hardware of the computer System. | Remember | CO 3 | CLO 09 | AIT005.09 |
| 13 | How a user can generate SIGKILL signal? | kill function generates SIGKILL signal to terminate process without ignore. Eg. kill -9 2563 | Remember | CO 3 | CLO 09 | AIT005.09 |
| 14 | What is the use of function sigpending()? | sigpending() returns the set of signals that are pending for delivery to the calling thread (i.e., the signals which have been raised while blocked). The mask of pending signals is returned in set. | Remember | CO 3 | CLO 09 | AIT005.09 |
| 15 | How to terminate the process abnormally? | The abort() function causes abnormal process termination to occur, unless the signal SIGABRT is being caught and the signal handler does not return. | Remember | CO 3 | CLO 07 | AIT005.07 |
| 16 | Explain use of sleep function? | sleep function suspend execution of process for an interval of time. #include <unistd.h> unsigned int sleep(unsigned int seconds); | Understand | CO 3 | CLO 09 | AIT005.09 |
| UNIT-IV | | | | | | |
| 1 | Define pipe in Inter process communication? | Pipe were the first widely used inter process communication method available both within programs and from the shell. The problem with pipe is that they are usable only between processes that have a | Remember | CO 4 | CLO 10 | AIT005.10 |

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| | | ancestor, this problem is solved with the named pipes or FIFOs | | | | |
| 2 | List down the types of IPC? | Types of Inter process communication. <ul style="list-style-type: none"> • Message Queues • Semaphore • Shared memory | Remember | CO 4 | CLO 10 | AIT005.10 |
| 3 | Explain the purpose of ftok function with format | This function used to generate a IPC key. The general format for this function is <code># include<sys/ipc.h></code> <code>key_t ftok(const char *pathname, int id);</code> This function takes information derived from the pathname, the files inode number and the lower order 8 bits of id. | Remember | CO 4 | CLO 10 | AIT005.10 |
| 4 | Explain the purpose of popen and pclose functions with format? | The popen function creates a pipe and initiates another process that either reads from the pipe or writes to the pipe. | Remember | CO 4 | CLO 10 | AIT005.10 |
| 5 | Define message queue? | Message queue is a linked list of messages. It is used to make a communication between the related or unrelated processes | Remember | CO 4 | CLO 11 | AIT005.11 |
| 6 | What is the information available in system V message queue? | Read write permissions, pointer to first message, pointer to last message, number of bytes currently in queue, Number of messages in the queue, maximum number of bytes allowed, process id of last message send, process id of last message receive, process time of last message send, time of last message receive, time of last message control function called. | Remember | CO 4 | CLO 11 | AIT005.11 |
| 7 | List down the system calls related to system V message queue with description. | msgget- to create a new message queue or open an existing message queue. msgsnd – to send a message to a queue msgrcv – to receive a message from a message queue. msgctl – to provide a variety of control operations in a message queue. | Remember | CO 4 | CLO 11 | AIT005.11 |
| 8 | What is the use of Mutex? | Mutex is used to protect a critical region, to make certain that only one thread at a time executes the code with in the region. | Remember | CO 4 | CLO 05 | AIT005.05 |
| 9 | List down the function formats for lock and unlock a region. | <code>#include<pthread.h></code> <code>int pthread_mutex_lock(pthread_mutex_t *mptr);</code> <code>int pthread_mutex_trylock(pthread_mutex_t *mptr);</code> <code>int pthread_mutex_unlock(pthread_mutex_t *mptr);</code> | Remember | CO 4 | CLO 05 | AIT005.05 |
| 10 | What do you mean by semaphore? List down different types of semaphore. | Semaphore is a primitive used to provide synchronization between various processes or between the various threads in a given process. <i>f</i> The types of semaphore are <i>f</i> Posix named semaphores <i>f</i> Posix memory based semaphore <i>f</i> System V semaphores. | Remember | CO 4 | CLO 13 | AIT005.13 |
| 11 | List down the operations performed on a semaphore by semaphore. | Operations performed on a semaphore by semaphore are. <ul style="list-style-type: none"> • Create a semaphore • Wait for a semaphore • Post to a semaphore | Remember | CO 4 | CLO 13 | AIT005.13 |
| 12 | Write down the differences between the semaphore and mutexes | The thread that locked the mutex, where as a semaphore the same thread that did the semaphore wait need not perform post, | Remember | CO 4 | CLO 13 | AIT005.13 |

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| | and condition variables. | must always unlock a mutex.. A mutex is either locked or unlocked. | | | | |
| 13 | What is difference between pipe and fifo in IPC? | pipes communication is among the process having a common ancestor (related process). FIFO is not necessary for the process having a common ancestor for communication (unrelated process). | Remember | CO 4 | CLO 10 | AIT005.10 |
| 14 | What is IPC? | Interprocess communication (IPC) is a set of programming interfaces that allow a programmer to coordinate activities among different program processes that can run concurrently in an operating system. This allows a program to handle many user requests at the same time. Since even a single user request may result in multiple processes running in the operating system on the user's behalf, the processes need to communicate with each other. | Remember | CO 4 | CLO 10 | AIT005.10 |
| 15 | Explain use of msgctl() in message queue IPC? | msgctl() performs various operations on a queue. Generally it is use to destroy message queue. | Remember | CO 4 | CLO 11 | AIT005.11 |
| UNIT-V | | | | | | |
| 1 | Define shared memory? | Shared Memory is the fastest form of IPC. It is a memory shared by unrelated processes. Once the memory is mapped into the address space of the process that are sharing the memory region no kernel involvement occurs in placing data between the processes | Remember | CO 5 | CLO 12 | AIT005.12 |
| 2 | Write the advantages of shared memory. | Advantages of shared memory. <ul style="list-style-type: none"> • faster method than queues • does not require extra kernel buffer • safe, manipulated like other variables | Remember | CO 5 | CLO 12 | AIT005.12 |
| 3 | Explain how to handle shared memory in IPC. | <i>shmget()</i> . int shmget(key_t,size_tsize,intshmflg); upon successful completion, shmget() returns an identifier for the shared memory segment. | Remember | CO 5 | CLO 12 | AIT005.12 |
| 4 | Discuss how to attach and detach to shared memory. | shmat(). Before you can use a shared memory segment, you have to attach yourself to it using shmat(). void *shmat(int shmids ,void *shmaddr ,int shmflg); shmids is shared memory id. shmaddr specifies specific address to use but we should set it to zero and OS will automatically choose the address. | Remember | CO 5 | CLO 12 | AIT005.12 |
| 5 | How to control shared memory using semaphore. | To perform synchronization using semaphores, following are the steps – Step 1 – Create a semaphore or connect to an already existing semaphore (semget()) Step 2 – Perform operations on the semaphore i.e., allocate or release or wait for the resources (semop()) Step 3 – Perform control operations on the | Remember | CO 5 | CLO 12 | AIT005.12 |

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| 6 | List wellknown ports for TCP and UDP. | message queue (semctl()) 21 – File Transfer Protocol, 23 – Telnet Protocol, 7 – echo Protocol | Remember | CO 5 | CLO 14 | AIT005.14 |
| 7 | Define little byte endian order, big byte endian order | Little byte endian order. in sixteen bit integer number the low order byte at the starting address. Big byte endian order. in sixteen bit integer number the high order byte at the starting address. | Remember | CO 5 | CLO 14 | AIT005.14 |
| 8 | Define sockets? | A socket is a construct to provide a communication between computers. It hides the underlying networking concepts and provides us with an interface to communicate between computers. | Remember | CO 5 | CLO 14 | AIT005.14 |
| 9 | What is the purpose of connect and bind function in socket? | The connect function is used by a TCP client to establish a connection with a TCP server. The bind function assigns a local protocol address to a socket. | Remember | CO 5 | CLO 14 | AIT005.14 |
| 10 | What are the actions performed by listen function in sockets? | The listen function is called by TCP server and it performs the following actions 9 It converts the unconnected socket into a passive socket, indicating that the kernel should accept incoming connection requests directed to this socket 9 It specifies the maximum number of connections that the kernel should queue for this socket. | Remember | CO 5 | CLO 14 | AIT005.14 |
| 11 | Define concurrent servers and iterative servers? | The servers that can handle multiple clients simultaneously are called concurrent servers. The servers that can handle multiple clients serially are called concurrent servers. | Remember | CO 5 | CLO 15 | AIT005.15 |
| 12 | Define UDP sockets. | UDP is a connection less unreliable, datagram protocol. In UDP the client does not establish connection with a server. Instead the client just sends a datagram to the server. | Remember | CO 5 | CLO 14 | AIT005.14 |
| 13 | Define TCP sockets. | TCP sockets provide a simple and effective way to provide connection oriented client server networking. | Remember | CO 5 | CLO 14 | AIT005.14 |
| 14 | What are the differences between raw IPv6 sockets with ordinary raw output? | All fields in the protocol send or received on a raw IPv6 socket are in network byte order There is no equivalent of IP_HDRINCL socket option with IPv6. Checksums on raw Ipv6 sockets are handled differently using the IPv6 socket option | Remember | CO 5 | CLO 14 | AIT005.14 |
| 15 | What are the different level constants are available for socket option functions? | Different level constants are available for socket option functions are . SQL-SOCKET, IPPROTO_IP, IPPROTO_ICMPV6, IPPROTO_IPV6, IPPROTO_TCP. | Remember | CO 5 | CLO 14 | AIT005.14 |

Signature of the Faculty

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