

NGM COLLEGE
DEPARTMENT OF COMPUTER SCIENCE (SF)

17UCS309 – OPERATING SYSTEM

K1 LEVEL QUESTIONS

UNIT-I

1. What is operating system?

- a) collection of programs that manages hardware resources
- b) system service provider to the application programs
- c) link to interface the hardware and application programs
- d) all of the mentioned

Answer: d

2. To access the services of operating system, the interface is provided by the

- a) System calls
- b) API
- c) Library
- d) Assembly instructions

Answer: a

3. Which one of the following is not true?

- a) Kernel is the program that constitutes the central core of the operating system
- b) kernel is the first part of operating system to load into memory during booting
- c) kernel is made of various modules which cannot be loaded in running operating system
- d) kernel remains in the memory during the entire computer session

Answer: c

4. Which one of the following error will be handle by the operating system?

- a) Power failure
- b) lack of paper in printer
- c) connection failure in the network
- d) all of the mentioned

Answer: d

5. The main function of the command interpreter is

- a) to get and execute the next user-specified command

- b) to provide the interface between the API and application program
- c) to handle the files in operating system
- d) none of the mentioned

Answer: a

6. By operating system, the resource management can be done via

- a) time division multiplexing
- b) space division multiplexing
- c) both time and space division multiplexing
- d) none of the mentioned

Answer: c

7. If a process fails, most operating system write the error information to a _____

- a) log file
- b) another running process
- c) new file
- d) none of the mentioned

Answer: a.

8. Which one of the following is not a real time operating system?

- a) VxWorks
- b) Windows CE
- c) RTLinux
- d) Palm OS

Answer: d

9. The OS X has _____

- a) monolithic kernel
- b) hybrid kernel
- c) microkernel
- d) monolithic kernel with modules

Answer: b

10. The systems which allows only one process execution at a time, are called

- a) uniprogramming systems
- b) uniprocessing systems
- c) unitasking systems
- d) none of the mentioned

Answer: b

UNIT-II

11. In operating system, each process has its own

- a) address space and global variables
- b) open files
- c) pending alarms, signals and signal handlers
- d) all of the mentioned

Answer: d

12. In Unix, Which system call creates the new process?

- a) fork
- b) create
- c) new
- d) none of the mentioned

Answer: a

13. A process can be terminated due to

- a) normal exit
- b) fatal error
- c) killed by another process
- d) all of the mentioned

Answer: d

14. What is the ready state of a process?

- a) when process is scheduled to run after some execution
- b) when process is unable to run until some task has been completed
- c) when process is using the CPU
- d) none of the mentioned

Answer: a

15. What is interprocess communication?

- a) Communication within the process
- b) communication between two process
- c) communications between two threads of same process
- d) none of the mentioned

Answer: b

16. A set of processes is deadlock if
- a) each process is blocked and will remain so forever
 - b) each process is terminated
 - c) all processes are trying to kill each other
 - d) none of the mentioned

Answer: a.

17. A process stack does not contain

- a) Function parameters
- b) Local variables
- c) Return addresses
- d) PID of child process

Answer: d

18. Which system call returns the process identifier of a terminated child?

- a) wait
- b) exit
- c) fork
- d) get

Answer: a

19. The address of the next instruction to be executed by the current process is provided by the

- a) CPU registers
- b) Program counter
- c) Process stack
- d) Pipe

Answer: b

20. A Process Control Block(PCB) does not contain which of the following :

- a) Code
- b) Stack
- c) Bootstrap program
- d) Data

View Answer

Answer: c

Explanation: None.

UNIT-III

21. The number of processes completed per unit time is known as _____

- a) Output
- b) Throughput
- c) Efficiency
- d) Capacity

View Answer

Answer: b

Explanation: None.

22. The state of a process is defined by:

- a) the final activity of the process
- b) the activity just executed by the process
- c) the activity to next be executed by the process
- d) the current activity of the process

View Answer

Answer: d

Explanation: None.

23. Which of the following is not the state of a process?

- a) New
- b) Old
- c) Waiting
- d) Running

View Answer

Answer: b

Explanation: None.

24. The Process Control Block is:

- a) Process type variable
- b) Data Structure
- c) A secondary storage section
- d) A Block in memory

View Answer

Answer: b

Explanation: None.

25. The entry of all the PCBs of the current processes is in:

- a) Process Register
- b) Program Counter
- c) Process Table

d) Process Unit

View Answer

Answer: c

Explanation: None.

26. The degree of multiprogramming is:

- a) the number of processes executed per unit time
- b) the number of processes in the ready queue
- c) the number of processes in the I/O queue
- d) the number of processes in memory

View Answer

Answer: d

Explanation: None.

27. A single thread of control allows the process to perform:

- a) only one task at a time
- b) multiple tasks at a time
- c) only two tasks at a time
- c) all of the mentioned

Answer: a.

28. The objective of multiprogramming is to :

- a) Have some process running at all times
- b) Have multiple programs waiting in a queue ready to run
- c) To minimize CPU utilization
- d) None of the mentioned

Answer: a.

29. Which of the following condition is required for deadlock to be possible?

- a) mutual exclusion
- b) a process may hold allocated resources while awaiting assignment of other resources
- c) no resource can be forcibly removed from a process holding it
- d) all of the mentioned

Answer: d

30. A system is in the safe state if

- a) the system can allocate resources to each process in some order and still avoid a deadlock
- b) there exist a safe sequence
- c) all of the mentioned
- d) none of the mentioned

Answer: a

UNIT-IV

31. The circular wait condition can be prevented by

- a) defining a linear ordering of resource types
- b) using thread
- c) using pipes
- d) all of the mentioned

Answer: a

32. Which one of the following is the deadlock avoidance algorithm?

- a) banker's algorithm
- b) round-robin algorithm
- c) elevator algorithm
- d) karn's algorithm

Answer: a

33. What is the drawback of banker's algorithm?

- a) in advance processes rarely know that how much resource they will need
- b) the number of processes changes as time progresses
- c) resource once available can disappear
- d) all of the mentioned

Answer: d

34. To avoid deadlock

- a) there must be a fixed number of resources to allocate
- b) resource allocation must be done only once
- c) all deadlocked processes must be aborted
- d) inversion technique can be used

Answer: a

35. If the wait for graph contains a cycle :

- a) then a deadlock does not exist
- b) then a deadlock exists
- c) then the system is in a safe state
- d) either deadlock exists or system is in a safe state

Answer: b

36. All unsafe states are :

- a) deadlocks
- b) not deadlocks

- c) fatal
- d) none of the mentioned

Answer: b

37. Physical memory is broken into fixed-sized blocks called _____

- a) frames
- b) pages
- c) backing store
- d) none of the mentioned

Answer: a

38. Logical memory is broken into blocks of the same size called _____

- a) frames
- b) pages
- c) backing store
- d) none of the mentioned

Answer: b

39. The _____ is used as an index into the page table.

- a) frame bit
- b) page number
- c) page offset
- d) frame offset

Answer: b

40. _____ is the concept in which a process is copied into main memory from the secondary memory according to the requirement.

- a) Paging
- b) Demand paging
- c) Segmentation
- d) Swapping

Answer: b

UNIT-V

41. Linux uses a time-sharing algorithm

- a) to pair preemptive scheduling between multiple processes
- b) for tasks where absolute priorities are more important than fairness
- c) all of the mentioned

d) none of the mentioned

Answer: a

42. First linux kernel which supports the SMP hardware was

a) linux 0.1

b) linux 1.0

c) linux 1.2

d) linux 2.0

Answer: d

43. Which one of the following linux file system does not support journaling feature?

a) ext2

b) ext3

c) ext4

d) none of the mentioned

Answer: a

44. Which binary format is supported by linux?

a) a.out

b) elf

c) both a.out and ELF

d) none of the mentioned

Answer: c

45. Which one of the following bootloader is not used by linux?

a) GRUB

b) LILO

c) NTLDR

d) None of the mentioned

Answer: c

46. The first process launched by the linux kernel is

a) init process

b) zombie process

c) batch process

d) boot process

Answer: a

47. Which desktop environment is not used in any linux distribution?

a) gnome

- b) kde
- c) unity
- d) none of the mentioned

Answer: d

48. Standard set of functions through which interacts with kernel is defined by

- a) system libraries
- b) kernel code
- c) compilers
- d) utility programs

Answer: a

49. Linux is

- a) single user, single tasking
- b) single user, multitasking
- c) multi user, single tasking
- d) multi user, multitasking

Answer: d

50. Which one of the following is not a linux distribution?

- a) debian
- b) gentoo
- c) open SUSE
- d) multics

Answer: d

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K2 LEVEL QUESTIONS

UNIT-I

1) Explain the main purpose of an operating system?

Operating systems exist for two main purposes. One is that it is designed to make sure a computer system performs well by managing its computational activities. Another is that it provides an environment for the development and execution of programs.

2) What are the different operating systems?

1. Batched operating systems
2. Multi-programmed operating systems
3. timesharing operating systems
4. Distributed operating systems
5. Real-time operating systems

3. What are the basic functions of an operating system?

Operating system controls and coordinates the use of the hardware among the various applications programs for various uses. Operating system acts as resource allocator and manager. Also operating system is control program which controls the user programs to prevent errors and improper use of the computer. It is especially concerned with the operation and control of I/O devices.

4) What is demand paging?

Demand paging is referred when not all of a process's pages are in the RAM, then the OS brings the missing(and required) pages from the disk into the RAM.

5) What are the advantages of a multiprocessor system?

With an increased number of processors, there is a considerable increase in throughput. It can also save more money because they can share resources. Finally, overall reliability is increased as well.

6) What is kernel?

A kernel is the core of every operating system. It connects applications to the actual processing of data. It also manages all communications between software and hardware components to ensure usability and reliability.

7) What are real-time systems?

Real-time systems are used when rigid time requirements have been placed on the operation of a processor. It has well defined and fixed time constraints.

8) What is a virtual memory?

Virtual memory is a memory management technique for letting processes execute outside of memory. This is very useful especially if an executing program cannot fit in the physical memory.

9) Describe the objective of multiprogramming.

The main objective of multiprogramming is to have a process running at all times. With this design, CPU utilization is said to be maximized.

10) What is time- sharing system?

In a Time-sharing system, the CPU executes multiple jobs by switching among them, also known as multitasking. This process happens so fast that users can interact with each program while it is running.

UNIT-II

11) What is difference between micro kernel and macro kernel?

Micro kernel is a kernel which runs services that are minimal for operating system performance. In this kernel all other operations are performed by processor.

Macro Kernel is a combination of micro and monolithic kernel. In monolithic kernel all operating system code is in single executable image.

12) What is dead lock?

Deadlock is a situation or condition where the two processes are waiting for each other to complete so that they can start. This results in both the processes hanging.

13) What is a process?

A program in execution is called a process.

Processes are of two types:

1. Operating system processes
2. User processes

14) What are the states of a process?

1. New
2. Running
3. Waiting
4. Ready
5. Terminated

15) What is semaphore?

Semaphore is a variable, whose status reports common resource. Semaphore is of two types: one is Binary semaphore and the other is Counting semaphore.

16) What is context switching?

Transferring the control from one process to another process requires saving the state of the old process and loading the saved state for the new process. This task is known as context switching.

17) What is process synchronization?

A situation, where several processes access and manipulate the same data concurrently and the outcome of the execution depends on the particular order in which the access takes place, is called a race condition. To guard against the race condition, we need to ensure that only one process at a time can be manipulating the same data. The technique we use for this is called process synchronization.

18) What is virtual memory?

Virtual memory is hardware technique where the system appears to have more memory than it actually does. This is done by time-sharing, the physical memory and storage parts of the memory on disk when they are not actively being used.

19) Briefly explain FCFS.

FCFS stands for First-come, first-served. It is one type of scheduling algorithm. In this scheme, the process that requests the CPU first is allocated the CPU first. Implementation is managed by a FIFO queue.

UNIT-III

20) What is RR scheduling algorithm?

RR (round-robin) scheduling algorithm is primarily aimed for time-sharing systems. A circular queue is a setup in such a way that the CPU scheduler goes around that queue, allocating CPU to each process for a time interval of up to around 10 to 100 milliseconds.

21) What are necessary conditions which can lead to a deadlock situation in a system?

Deadlock situations occur when four conditions occur simultaneously in a system: Mutual exclusion; Hold and Wait; No preemption; and Circular wait.

22) Describe Banker's algorithm

Banker's algorithm is one form of deadlock-avoidance in a system. It gets its name from a banking system wherein the bank never allocates available cash in such a way that it can no longer satisfy the needs of all of its customers.

23) What factors determine whether a detection-algorithm must be utilized in a deadlock avoidance system?

One is that it depends on how often a deadlock is likely to occur under the implementation of this algorithm. The other has to do with how many processes will be affected by deadlock when this algorithm is applied.

24) State the main difference between logical from physical address space.

Logical address refers to the address that is generated by the CPU. On the other hand, physical address refers to the address that is seen by the memory unit.

25) What are overlays?

Overlays are used to enable a process to be larger than the amount of memory allocated to it. The basic idea of this is that only instructions and data that are needed at any given time are kept in memory.

26) What is the basic function of paging?

Paging is a memory management scheme that permits the physical address space of a process to be noncontiguous. It avoids the considerable problem of having to fit varied sized memory chunks onto the backing store.

27) What is fragmentation?

Fragmentation is memory wasted. It can be internal if we are dealing with systems that have fixed-sized allocation units, or external if we are dealing with systems that have variable-sized allocation units.

28) How does swapping result in better memory management?

During regular intervals that are set by the operating system, processes can be copied from main memory to a backing store, and then copied back later. Swapping allows more operations to be run that can fit into memory at one time.

29) Give an example of a Process State.

- New State – means a process is being created
- Running – means instructions are being executed
- Waiting – means a process is waiting for certain conditions or events to occur
- Ready – means a process is waiting for an instruction from the main processor
- Terminate – means a process is stopped abruptly

30) What is a socket?

A socket provides a connection between two applications. Each endpoint of a communication is a socket.

UNIT-IV

31) What is Direct Access Method?

Direct Access method is based on a disk model of a file, such that it is viewed as a numbered sequence of blocks or records. It allows arbitrary blocks to be read or written. Direct access is advantageous when accessing large amounts of information.

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32) What is the best page size when designing an operating system?

The best paging size varies from system to system, so there is no single best when it comes to page size. There are different factors to consider in order to come up with a suitable page size, such as page table, paging time, and its effect on the overall efficiency of the operating system.

33) When designing the file structure for an operating system, what attributes are considered?

Typically, the different attributes for a file structure are naming, identifier, supported file types, and location for the files, size, and level of protection.

34) What is the purpose of an I/O status information?

I/O status information provides information about which I/O devices are to be allocated for a particular process. It also shows which files are opened, and other I/O device state.

35) What is multitasking?

Multitasking is the process within an operating system that allows the user to run several applications at the same time. However, only one application is active at a time for user interaction, although some applications can run “behind the scene”.

36) Explain pros and cons of a command line interface?

A command line interface allows the user to type in commands that can immediately provide results. Many seasoned computer users are well accustomed to using the command line because they find it quicker and simpler.

However, the main problem with a command line interface is that users have to be familiar with the commands, including the switches and parameters that come with it. This is a downside for people who are not fond of memorizing commands.

37) What is Throughput, Turnaround time, waiting time and Response time?

Throughput number of processes that complete their execution per time unit

Turnaround time amount of time to execute a particular process

Waiting time amount of time a process has been waiting in the ready queue

Response time amount of time it takes from when a request was submitted until the first response is produced, not output (for time-sharing environment)

38) What is Memory-Management Unit (MMU)?

Hardware device that maps virtual to physical address. In MMU scheme, the value in the relocation register is added to every address generated by a user process at the time it is sent to memory.

->The user program deals with logical addresses; it never sees the real physical addresses

39) What is caching?

Caching is the processing of utilizing a region of fast memory for a limited data and process. A cache memory is usually much efficient because of its high access speed.

40) What is spooling?

Spooling is normally associated with printing. When different applications want to send an output to the printer at the same time, spooling takes all of these print jobs into a disk file and queues them accordingly to the printer.

UNIT-V

41) What is an Assembler?

An assembler acts as a translator for low-level language. Assembly codes written using mnemonic commands are translated by the Assembler into machine language.

42) What are interrupts?

Interrupts are part of a hardware mechanism that sends a notification to the CPU when it wants to gain access to a particular resource. An interrupt handler receives this interrupt signal and “tells” the processor to take action based on the interrupt request.

43) What is preemptive multitasking?

Preemptive multitasking allows an operating system to switch between software programs. This, in turn, allows multiple programs to run without necessarily taking complete control over the processor and resulting in system crashes.

44) What is a long term scheduler & short term schedulers?

Long term schedulers are the job schedulers that select processes from the job queue and load them into memory for execution. The short term schedulers are the CPU schedulers that select a process from the ready queue and allocate the CPU to one of them.

45) Explain the meaning of mutex.

Mutex is the short form for Mutual Exclusion object. A mutex allows multiple threads for sharing the same resource. The resource can be file. A mutex with a unique name is created at the time of starting a program. A mutex must be locked from other threads, when any thread that needs the resource. When the data is no longer used / needed, the mutex is set to unlock.

46) What is cycle stealing?

We encounter cycle stealing in the context of Direct Memory Access (DMA). Either the DMA controller can use the data bus when the CPU does not need it, or it may force the CPU to temporarily suspend operation. The latter technique is called cycle stealing. Note that cycle stealing can be done only at specific break points in an instruction cycle.

47) What are the sub-components of I/O manager in Windows NT?

- 1) Network redirector/ Server
- 2) Cache manager.
- 3) File systems
- 4) Network driver
- 5) Device driver

48) How would a file name EXAMPLEFILE.TXT appear when viewed under the DOS command console operating in Windows 98?

The filename would appear as EXAMPL~1.TXT. The reason behind this is that filenames under this operating system are limited to 8 characters when working under DOS environment.

49) What are the reasons for process suspension?

- 1) Swapping
- 2) interactive user request
- 3) timing
- 4) parent process request

50) What is a drawback of MVT?

- 1) Ability to support multiple processors
- 2) virtual storage
- 3) source level debugging

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K3 LEVEL QUESTIONS

UNIT-I

1. Discuss about the evolution of Virtual machines. Also explain how virtualization could be implemented in operating systems.
2. Sketch the structure of direct memory Access in detail.
3. Explain the various types of System calls with an example for each.
4. Discuss about the functionality of system boot with respect to operating system.
5. Explain the operating system structure and its component.
6. Define operating system and list out the function and component of operating system.
7. Differentiate symmetric and asymmetric multiprocessing system.
8. In what ways is the modular kernel approach similar to the layered approaches?
9. Explain the various memory hierarchies with neat block diagram
10. What is the important feature of critical section? State the dining philosopher's problem and show how to allocate the several resources among several processes in a deadlock and starvation free manner.

UNIT-II

11. How can deadlock be detected? Explain.
12. Write about the various CPU scheduling algorithms.
13. Write notes about multiple-processor scheduling and real-time scheduling.
14. Write about critical regions and monitors.
15. Consider the following five processes, with the length of the CPU burst time given in milliseconds. Process Burst time P1 10 P2 29 P3 3 P4 7 P5 12 Consider the First come First serve (FCFS),

Non Preemptive Shortest Job First (SJF), Round Robin (RR) (quantum=10ms) scheduling algorithms. Illustrate the scheduling using Gantt chart. Which algorithm will give the minimum average waiting time? Discuss.

16. Consider the following page reference string 7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2, 1, 2, 0, 1, 7, 0, 1. How many page faults would occur for the following replacement algorithms, assuming three frames that all frames are initially empty?

17. i) Construct a Resource Allocation Graph for the following scenario. At time t Process P1 request for a resource X, process P2 requests for a resource Y. Both the resources are Available and they are allocated to the requesting process. At time t_1 where $t_1 > t_2$ both the processes are still holding the resources, however process P1 request for Y which is held by P2, process P2 request for X held by P1. Will there be a deadlock? If there is a deadlock discuss the four necessary conditions for deadlock, else justify there is no deadlock.

ii) With relevant example show that the implementation of a semaphore with a waiting queue may result in deadlock

18. Discuss about the issues to be considered with multithreaded programs.

19. Write about the three common types of threading implementation.

20. Explain the two solutions of recovery from deadlock

UNIT-III

21. Differentiate local and global page replacement algorithm.

22. What is virtual memory? Mention its advantages.

23. What is the maximum file size supported by a file system with 16 direct blocks, single, double, and triple indirection? The block size is 512 bytes. Disk block number can be stored in 4 bytes.

24. List the steps needed to perform page replacement.

25. Differentiate external fragmentation with internal fragmentation.

26. Briefly explain and compare, fixed and dynamic memory partitioning schemes.

27. Explain with the help of examples FIFO and LR, optimal page replacement algorithms with example reference string. Mention the merits and demerits of each of the above algorithm.

28. Explain how paging supports virtual memory. With neat diagram explain hoe logical address is translated into physical address.

29. Explain memory management in Linux operating system.

30. Give the basic concepts about paging.

UNIT-IV

31. Write about the techniques for structuring the page table.

32. Explain the basic concepts of segmentation.

33. What is demand paging and what is its use?

34. Explain the various page replacement strategies.

35. What is thrashing and explain the methods to avoid thrashing?

36. Write short notes on swapping.

37. Explain Contiguous and Non contiguous memory allocation with example.

38. Explain page replacement algorithms.

39. Write briefly about file attributes, operations, types and structure.

40. Discuss in detail about file allocation methods. What are the possible structures for directory? Discuss them in detail.

UNIT-V

41. Explain about disk scheduling and any of its two algorithms with suitable example.

42. Explain the following: a. RAID b. I/O in Linux

43. Write a detailed note on various file access methods with neat sketch.

44. Explain in detail about free space management with neat diagram.

45. a. Describe the two levels and tree type directory structures in detail.

b. Describe the life cycle of an I/O request in detail.

46. a. Describe the Windows XP file system in detail.

b. Explain the directory structure of Linux operating system.

47. a. Describe how the disk space from deleted files can be reused.

b. Explain in detail the process management and file system in LINUX system.

48. Suppose that the disk drive has 5000 cylinders number 0 to 4999. The drive is currently serving a request at cylinder 143 and the previous request was at 125, the queue of the pending request in FIFO order is: 86, 1470, 913, 1174, 948, 1509, 1022, 1750, 130 starting from the current head position, what is the total distance (cylinders) that the disk arm moves to satisfy all the pending requests for each of the disk scheduling algorithms.

i. SSTF

ii. SCAN

iii. LOOK

iv. C-LOOK

49. Discuss in detail efficiency and performance in terms of Directories.

50. Write a detailed note on Free Space Management.

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K4, K5 QUESTIONS

UNIT-I

1. Explain the various types of computer systems.
2. What are the system components of an operating system and explain them?
3. Discuss in detail the various system calls.
4. Explain in detail inter process communication.
5. Discuss in detail threads and threading issues.

UNIT II -PROCESS SCHEDULING & SYNCHRONIZATION

1. Bring out a detailed discussion on the various CPU scheduling algorithms.
2. Discuss in detail semaphores.
3. Discuss in detail deadlock and its prevention mechanism.
4. Explain the Banker's algorithm for deadlock avoidance.
5. Discuss in detail the methods involved in the detection and recovery of deadlock.

UNIT III -STORAGE MANAGEMENT

1. Discuss in detail contiguous memory allocation
2. Discuss in detail paging.
3. Bring out a detailed study on Segmentation.
4. Explain in detail the various page replacement strategies.
5. Explain in detail thrashing and various methods to avoid thrashing

UNIT IV -FILE SYSTEMS

1. Discuss in detail File operations.
2. Explain in detail the Various File Access Methods.
3. Bring out a detailed study on the various logical structures of a Directory.
4. Discuss in detail File system.
5. Elaborate on the three major disk space allocation methods in detail.

UNIT V -I/O SYSTEMS

1. Discuss in detail the six step process to perform DMA transfer.
2. Briefly describe the services provided by the kernel I/ O's subsystem.
3. Explain in detail the life cycle of an I/O request
4. Describe in detail the different forms of disk scheduling.
5. Bring out a detailed study on RAID