Lok Nayak Jai Prakash Institute of Technology, Chapra
Department of Computer Science and Engineering
Second Year Engineering (CSE)
Semester – IV

Course Code: 061403 Title: Operating Systems

(OS)

UNIT-WISE QUESTION BANK

UNIT 1: INTORDUCTION TO OS

7M QUESTIONS

1. Define operating system and list the basic services provided by operating system.
2. Differentiate among the following types of OS by defining their essential properties.
    a) Time sharing system
    b) Parallel system
    c) Distributed system
    d) Real time system
3. Explain the essential properties of
    a) Batch System
    b) Time sharing
    c) Real time
    d) Parallel
    e) Distributed
    f) Handheld
    g) Embedded
    h) Smart Card O.S
4. Differentiate among the following types of OS by defining their essential properties:
    a) Time Sharing System
    b) Parallel System
    c) Simple batch System
    d) Real time System
5. Explain batch system and Multiprogrammed System in detail.
6. Explain the terms :
    a) Real time System
    b) Distributed System
7. Explain the terms :
    a) Parallel System
    b) Batch System
8. Explain O.S as extended machine in detail.
9. Explain OS as resources manager

10. Explain essential features of following structure of O.S

a) Monolithic System
b) Layered Systems
c) Micro Kernels
d) Client Server Model
e) Virtual Machines
f) kernels

2M/SHORT ANSWER QUESTIONS

1) What is the key difference between a trap and an interrupt?
2) What are the types of System calls?
3) List any four process management system call.
4) Define user mode and kernel mode. Why two modes are required?
5) What is the O.S features required for multiprogramming
6) What are the advantage and disadvantage of multiprocessor system?
7) Describe the difference between symmetric and asymmetric multiprocessing?
8) Distinguish between the client-server and peer-to-peer models of distributed system
9) What difference is between loosely coupled and tightly coupled system.
10) What are advantages of distributed System?
11) What are the requirements of hard real time and soft real time system?
12) What are the drawbacks of monolithic system?
13) What are the advantages of layered structure over monolithic structure?
14) Give examples of microkernel
15) What are differences between macro kernel and micro kernel?
16) Justify whether following statements are true or false
    a) The user application interacts directly with O.S.
    b) Shell is part of operating System

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UNIT 2: PROCESS MANAGEMENT

7M QUESTION

1) Define process and Explain process states in details with diagram
2) Explain process states and process control block in details
3) Explain the process state transition diagram used in multiprogramming environment. Describe the fields in a process control block (PCB).What is switching overhead?
4) What is thread? Explain classical thread model OR Explain threads in detail
5) Explain and differentiate between user level and kernel level thread.
6) List the main difference and similarities between threads and process.
7) What are various criteria for a good process scheduling algorithm? Explain any two preemptive scheduling algorithms in brief.
8) Explain the following process scheduling algorithm
    a) Priority scheduling
    b) Shortest job first scheduling
9) Explain the effect of increasing the time quantum to an arbitrary large Number and decreasing the time quantum to an arbitrary small number for round robin scheduling algorithm with suitable example?
10) Consider following processes with length of CPU burst time in milliseconds

Process	Burst time
P1	5
P2	10
P3	2
P4	1

All process arrived in order p1, p2, p3, p4 all time zero

a) Draw Gantt charts illustrating execution of these processes for SJF and round robin (quantum=1)
b) Calculate waiting time for each process for each scheduling algorithm
c) Calculate average waiting time for each scheduling algorithm

37. Consider following processes with length of CPU brust time in millisecond

Process	Brust time	Priority
P1	10	3

P2	1	1
P3	2	3
P4	1	4
P5	5	2

All processes arrived in order p1, p2, p3, p4, p5 all at time zero.

1) Draw Gant charts illustrating execution of these processes for SJF, non preemptive priority (smaller priority number implies a higher priority) & round robin(quantum=1)

2) Calculate turnaround time for each process for scheduling algorithm in part (1)

3) Calculate waiting time for each scheduling algorithm in part (1)

38. Explain the following term related to IPC: a) Race condition b) critical region

39. What are critical sections? Why mutual exclusion required? Explain any 2 methods of achieving mutual exclusion in detail.

40. Explain the terms related to IPC –a) Race condition b) critical section c)Mutual exclusion d)Semaphores

41. Explain in detail the following solutions for achieving mutual exclusion a)look variable b)TSL instruction

42. Explain Peterson's solution for achieving mutual exclusion

43. Discuss in detail following solution for achieving mutual exclusion a) Disabling interrupts b) Strict alteration

44. Explain semaphore in detail

45. What is semaphore? Discuss product-consumer problem with semaphore.

46. Write short note on: a) Dining philosopher problem b) System calls c) Monitors

d) Peterson's solution for achieving mutual exclusion e) Semaphores

f) Readers & writers problem.

47. Explain the terms: a) time sharing b) mutual exclusion

48. What is monitor? Explain solution for producer-consumer problem using monitor. Explain monitors in detail.

49. Write short on: a) message passing b) shell

50. How message passing is used in IPC.

51. What is message passing? Discuss procedure consumer problem with message passing.

52. Explain use of message passing & semaphore for inter process communication?

53. Explain dinning philosopher problem & its solution.

54. What is dinning philosopher problem? Explain its solution with monitor.

55. What is dinning philosopher problem? Explain its solution with semaphore.
56. Explain readers & writers problem? Give its solution with semaphore.
57. Write short notes on: a) Process states b) Critical section c) Race condition d) Starvation e) PCB f) Two level scheduling g) Round robin scheduling

UNIT 03: FILE MANAGEMENT

7 MARKS

58. What are the objectives and minimal set of requirement for the file management system?
59. What criteria are important in choosing a file organization?
60. Explain briefly file system architecture & file management function.
61. List& briefly explain 5 file organization.
62. Compare file organization methods
63. Which are the typical information elements of a file directory?
64. Which are the typical operations performed on directory?
65. What are the typical access rights that may be granted or denied to a particular user for a particular file?
66. What are methods of free space management of Disk?
67. Explain linked list allocation using index in details.
68. Explain file system consistency in detail.
69. Explain file system reliability & performance in detail.
70. What is directory? Explain directory operation in details.
71. Explain linked list allocation of file in detail.
72. Explain file system performance in detail.
73. Explain the following techniques to improve file system performance.
    a) block read ahead and
    b) Reducing disk arm motion
74. Explain file system implementation using linked list with index and i-node in detail?
75. Explain the following file allocation methods
    a) Contiguous allocation b) i-node
76. What are points to be consider in file system design? Explain linked list allocation & index allocation in detail.
77. Differentiate between windows and unix file system.

2 MARKS/SHORT ANSWER QUSTIONS

78. What is the difference between field and record?
79. What is the difference between file and database?
80. What is file management system?
81. What is relation between pathname & a working directory?

UNIT 4: MEMORY MANAGEMENT

82. What are the memory management requirements?
83. Explain multiprogramming with fixed partition.
84. Explain multiprogramming with dynamic partition.
85. Write short note on: Relocation problem for multiprogramming with fixed partitions.
86. Explain static partitioned allocation with partition sizes 300,150, 100, 200, 20. Assuming first fit method indicate the memory status after memory request for sizes 80, 180, 280, 380, 30.
87. Discuss in details memory management with buddy system.
88. A 1MB block of memory is allocated using the buddy system.
    i. Show the results of the following sequence in a figure: Request 70; Request 35; Request 80; Return A; Request 60; Return B; Return D; Return C.
    ii. Show the binary tree representation following Return B.
89. Explain memory management with bit maps in detail.
90. Explain memory management with linked list in details.
91. What are the differences of internal and external memory Fragmentation?
92. Explain following allocation algorithm.
    a. First fit
    b. Best fit
    c. Worst fit
    d. Next fit
93. Explain the difference between logical and physical addresses?
94. What is paging? Discuss basic paging technique in details.

    OR

    Explain paging in detail.
95. Explain hierarchical page table and inverted page table.
96. Explain Segmentation in detail.

    OR

    What is segmentation? Explain the basic segmentation method.
97. What is demand paging? Explain it with address translation mechanism used. What are its specific advantages? How a page table is implemented?
98. What is virtual memory? How it is implemented.
99. Write short on:
    a. multiprogramming with fixed & variable partition.

b. Relocation problem for multiprogramming with fixed partition.
c. Use of multiprogramming in memory management.
d. TLB.
e. Paging.
f. Design issues of paging system.
g. Relocation and protection.
h. policy driven scheduling.

100. Write short note on:
a. Segmentation
b. Page table
c. Compaction
d. Working set model
e. fragmentation

101. Write short note on:
a) Not-recently used page replacement algorithm.
b) Optimal page replacement algorithm.
c) Swapping.
d) Relocation and protection.

102. Explain following page replacement algorithm in detail.
i. LRU ii. FIFO

103. Explain the following page replacement algorithm.
a) Optimal page replacement
b) Least recently used page replacement.

104. Explain difference between internal external fragmentations in detail.

105. Consider the following page reference string.

1,2,3,4,5,3,4,1,6,7,8,7,8,9,7,8,9,5,4,5,4,2How many page faults would occur for the following replacement algorithm, assuming four and six frames respectively? a. page replacement. b. FIFO page replacement.

106. Describe the term page fault frequency. What is thrashing? How is it controlled by OS?

107. Free memory holes of sizes 15K, 10K, 5K, 25K, 30K, 40K are available. The processes of size 12K, 2K,

25K, 20K is to be allocated. How processes are placed in first fit, best fit, worst fit. Calculate internal as well as external fragmentation.

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108. On a simple paging system with 2^24 bytes of physical memory, 256 pages of logical address Space, and a, page size of 2^10 bytes, how many bits are in logical address?

109. A certain computer provides its user with a virtual memory space of 2^32 bytes. The computer has 2^35 bytes of physical memory. The virtual memory is implemented by paging the page size is 4096 bytes. A user process generates the virtual address 11123456. Explain how the system establishes the corresponding physical location.

110. Calculate page faults for (LRU, FIFO, OPT) for following sequences where page frame is three.

0,1,2,1,4,2,3,7,2,1,3,5,1,2,5.

UNIT 5: DEVICE MANAGEMENT

111. Discuss briefly the following issues related to device independent i/o software.
    a. Uniform interfacing for device drivers.
    b. Buffering.
112. Discuss in details devices drivers.
113. Write short notes on:
    a. Devices independent I/O software
    b. Goals of I/O software
    c. Interrupt handler
    d. I/O Devices.
    e. Device drivers
    f. Device controllers
    g. Disk space management
    h. Disk arm scheduling algorithm
114. Discuss the following:
    a) Magnetic disk
    b) CDs
    c) RAID
    d) DVDs
    e) Formatting Disk
115. Discuss the following related to disk space management
    a) Block size
    b) Keeping track of free blocks.

116. Suppose a disk drive has 400 cylinders , numbered 0 to 399.The driver is currently serving a request at cylinder 143 and previous request was at cylinder 125 .The queue of pending request in FIFO order is: 86,147,312,91,177,48,309,222,175,130.

Starting from the current head position what is the total distance in cylinders that the disk to satisfy all the pending request for each of the following disk scheduling algorithms?

1] SSTS 2] SCAN 3] C-SCAN

UNIT 6: DEADLOCK AND CASE STUDY

117. What are the conditions for deadlock? Explain deadlock detection and recovery in detail.
118. Explain deadlock prevention in detail.
119. Write short notes on:
    a. Deadlock modeling.
    b. Banker's algorithm**.**
120. Explain deadlock avoidance using banker's algorithm in details.
121. What is deadlock? Explain deadlock detection with multiple resources of each type.
122. Explain bankers algorithm for multiple resources to avoid deadlock.
123. Explain various methods for recovery from deadlock.
124. Discuss deadlock detection with one resource of each type.
125. Write short notes on-
    a) Bankers algorithm for single resources.
    b) Ostrich algorithm.
126. Explain deadlock avoidance with suitable example using banker's algorithm.
127. Consider the following snapshot-

	Allocated				Max				Available			
	A	B	C	D	A	B	C	D	A	B	C	D
P0	0	0	1	2	0	0	1	2	1	5	2	0
P1	1	0	0	0	1	7	5	0				
P2	1	3	5	4	2	3	5	6				
P3	0	6	3	2	0	6	5	2				
P4	0	0	1	4	0	6	5	6				

Answer the following questions using banker's algorithm:
a) What are contents of matrix end?
b) Is the system in safe state?
c) If request for process p1 arrives for (0,4,2,0) .Can the request be granted immediately?

128. What are deadlock? Explain its model with example. Explain any three methods of dealing with deadlock.

129. A system has three types of resources R1 R2 R3 and their number of units are 3, 2, 2 respectively. Four processes P1 P2 P3 p4 are currently competing for these resources in following number.

1. P1 is holding one unit of R1 and is requesting for one unit of R2.
2. P2 is holding two units of R2 and is requesting for one unit each of R1 and R3.
3. P3 is holding one unit of R1 and is requesting for one unit of R2.
4. P4 is holding two units of R3 and requesting for one unit of R1.

Determine which if any of the processes are deadlock in this state**.**

130. Explain swap space management methods of disk in detail.

131. Consider system with total of 150 minutes of memory allocated to three processes as shown. Apply banker's algorithm to determine whether it would be safe to grant each of following request. If yes-Indicate sequence of termination that could be possible. If no- Show reduction of resulting allocation table.

1. A 4^{th} process is arrived with maximum need of 60 and initial need of 25 units.
2. A 4^{th} process is arrived with maximum need of 60 and initial need of 35 units.

Process	Max	Hold
P1	70	45
P2	60	10
P3	60	15

132. Explain history of windows operating system.

133. Write short notes on-

a) Features of windows- 7.
b) WINDOWS -7 architecture
c) WINDOWS -7 Registry

134. Explain architectural features of WINDOWS-7.

135. Explain system structure of WINDOWS- 7.
136. Explain process and thread management WINDOWS- 7 in detail.
137. Explain in brief concurrency control supported by WINDOWS -7.
138. Briefly explain security features of WINDOWS7.
139. Explain memory management and I/O management.