



ENGINEERING & MANAGEMENT EXAMINATIONS, DECEMBER - 2007

OPERATING SYSTEM

SEMESTER - 5

Time : 3 Hours]

[Full Marks : 70

GROUP - A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for the following : 10 × 1 = 10

i) A thread is a

- a) task
- b) process
- c) program
- d) light weight process.

ii) Banker's Algorithm for Resource Allocation deals with

- a) deadlock prevention
- b) deadlock avoidance
- c) deadlock recovery
- d) mutual exclusion.

iii) An OS contains 3 user process each requiring 2 units of resources R. The minimum number of units of R such that no dead locks will ever arise is

- a) 3
- b) 5
- c) 4
- d) 6.

iv) Fork is

- a) the creation of a new job
- b) the dispatching of a task
- c) increasing the priority of a task
- d) creation of new task.



v) Which of the following is false ?

- a) Segmentation suffers from external fragmentation
- b) Paging suffers from internal fragmentation
- c) Virtual memory is used only in multi-user system
- d) Segmented memory can be paged.

vi) Thrashing

- a) reduces page I/O
- b) decreases the degree of multiprogramming
- c) implies excessive page I/O
- d) improves the system performance.

vii) RAID configuration disks are used to provide

- a) fault tolerance
- b) nearest cylinder next
- c) high data density
- d) none of these.

viii) Which of the following page replacement algorithms suffers from Belady's anomaly ?

- a) Optimal replacement
- b) LRU
- c) FIFO
- d) Both (a) and (c).

ix) Which scheduling policy is most suitable for the time-sharing operating system ?

- a) Shortest job first
- b) Round Robin
- c) First come first serve
- d) Multilevel queue.

x) The default remedy of starvation is

- a) Ageing
- b) Critical Section
- c) Mutual Exclusion
- d) All of these.



GROUP - B

(Short Answer Type Questions)

Answer any *three* of the following.

3 × 5 = 15

- 2. Can busy waiting be avoided altogether ? Explain your answer with example. 1 + 4
- 3. What is fragmentation ? How can it be overcome ?
- 4. Given memory partitions of 100 k, 500 k, 200 k, 300 K & 600 k (in order). How would each of the first-fit, best-fit & worst-fit algorithms place processes of 212 k, 417 k, 112 k & 426 k (in order) ? Which algorithm makes the most efficient use of memory ?
- 5. Differentiate between "starvation" & "deadlock" with suitable example.
- 6. Prove that linear ordering for denying the "circular wait" condition actually prevents circuits from developing in resource allocation graphs.

GROUP - C

(Long Answer Type Questions)

Answer any *three* questions.

3 × 15 = 45

- 7. a) What is Mailbox ?
- b) What are the operations of scheduler & dispatcher ?
- c) How can context switch time be reduced ?
- d) Consider the following set of processes :

Process	CPU Burst Time	Priority	Arrival Time
P1	10	3	0
P2	1	1	0
P3	2	3	1
P4	1	4	3
P5	5	2	6

Draw the Gantt chart using RR ($t_s = 2$) & preemptive priority scheduling. Calculate average waiting time.

- e) Why is SJF called SRTF ? 2 + 3 + 2 + 6 + 2

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8. a) Write down the Readers-Writers algorithm using semaphore. Mention the difference between First - Reader / Writer and Second-Reader/Writer problem.
- b) What is Deadlock ? Explain the Banker's algorithm and show how it is helpful to overcome deadlock. 5 + 2 + 2 + 6

9. a) Write four necessary conditions for deadlock.
- b) What is indefinite postponement ? How does it differ from deadlock ? How is its similar ?
- c) Consider the following snapshot of a system :

Process	Allocation	Max	Available
	ABCD	ABCD	ABCD
P0	0012	0012	1520
P1	1000	1750	
P2	1354	2356	
P3	0632	0652	
P4	0014	0656	

Answer the following questions using the Banker's algorithm :

- i) What is the content of the matrix need ?
- ii) Is the system in a safe state ?
- iii) If a request from process P1 arrives for (0, 4, 2, 0), can the request be granted immediately ? 4 + 4 + 7

10. a) What are the different parameters required to measure disk performance ? Explain. 3
- b) Suppose a disk drive has 300 cylinders, numbered 0 to 299. The current head position of the disk is at 90. The queue of pending requests, in FIFO order is 36, 79, 15, 120, 199, 270, 89, 170.

Calculate the average cylinder movements for the following algorithms :

- i) SSTF
- ii) C-SCAN. 6
- c) Explain different file accessing methods with advantages and disadvantages. 6



11. a) Briefly explain

- i) Belady's anomaly
- ii) Virus vs. Worm
- iii) C-SCAN disk scheduling algorithm.

3 + 3 + 3

b) Consider the following reference string. Calculate the page fault rate for the following algorithms :

1, 2, 3, 4, 5, 3, 4, 1, 6, 7, 8, 7, 8, 9, 7, 8, 9, 5, 4, 5, 4, 2

- i) FIFO
- ii) LRU
- iii) Optimal

Assume that the memory size is 4 frames.

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END