

B.E. / B.Tech. Computer Science & Engineering (Model Curriculum) Semester-IV  
**SE203CS - Operating Systems**

P. Pages : 2

Time : Three Hours



**GUG/S/25/13808**

Max. Marks : 80

- Notes :
1. All questions are compulsory.
  2. Due credit will be given to neatness and adequate dimensions.
  3. Assume suitable data wherever necessary.

1. a) What is operating system? State and explain its functionalities. 8
- b) Is context switching an overhead or not? Prove with an example. 8

**OR**

2. a) Differentiate between threads and process with an example. 8
- b) Explain multilevel queue with an example. 8

3. a) Explain semaphore and its types. Consider a semaphore is initialized with 8

- 1) Consider 10 processes p1, p2, p3..... p10. All processes have same code as given below but one process p10 has signal(s) in place of wait(s). If all the processes execute multiple times, then maximum number of processes which can be in critical section together?

```
While(true) {  
    Wait(s) ;  
    CS  
    Signal(s);  
}
```

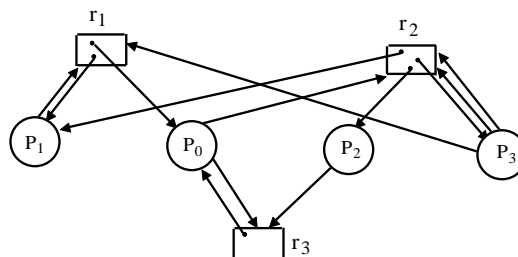
- b) Three process P1, P2 and P3 arrive at time zero. Their total execution time is 10ms, 15ms, and 20ms respectively. They spent first 20% of their execution time in doing I/O, next 60% in CPU processing and the last 20% again, doing I/O. For what percentage of time was the CPU free? Use Round robin algorithm with time quantum 5ms. 8

**OR**

4. a) Explain dining philosopher problem with respect to 8
- i) Solution using semaphore.                      ii) Deadlock solution in it.

- b) Explain the following: 8
- i) Printer spooler problem.                      ii) Race condition.

5. a) Consider the resource allocation graph in the figure. 8



Find if the system is in a deadlock state.  
Otherwise, find a safe sequence.

- b) Explain advantages and disadvantages of contiguous, linked and indexed allocation with examples and neat sketches. **8**

**OR**

6. a) Explain disk architecture with a diagram. What is the average access time for transferring 512 bytes of data with the following specifications- **8**  
 Average seek time = 5 msec  
 Disk rotation = 6000 RPM  
 Data rate = 40 KB/sec  
 Controller overhead = 0.1 msec.

- b) Consider a disk system with 100 cylinders. The requests to access the cylinders occur in following sequence – **8**  
 4, 34, 10, 7, 19, 73, 2, 15, 6, 20  
 Assuming that the head is currently at cylinder 50, what is the time taken to satisfy all requests if it takes 1 ms to move from one cylinder to adjacent one and shortest seek time first policy is used?

7. a) Explain working of best fit memory allocation technique. Solve the following problem With best fit algorithm: **8**

Req no.	A1	A2	A3	A4	A5	A6	A7	A8
Req size	2k	14k	3k	6k	6k	10k	7k	20k
Usage time	4	10	2	8	4	1	8	6

At what time A7 will be executed?

- b) Consider a paged memory system with logical address of 26 bits and physical address of 32 bits. The page size is 2kb. Further consider that one page table entry size is 4 bytes. Find: **8**  
 i) Bits in page offset.  
 ii) No of pages in process.  
 iii) Bits for page number  
 iv) Page table size.

**OR**

8. a) Explain segmentation with an example. **8**  
 b) Write a short note on Translation Lookaside Buffer. **8**
9. a) What is access matrix and various methods used to implement them in OS. **8**  
 b) Explain : **8**  
 i) Program threats  
 ii) System threats

**OR**

10. a) Explain security problems in OS. **8**  
 b) Explain Authentication in OS. **8**

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