CS/B.TECH/IT/ODD SEM/SEM-5/IT-503/2016-17

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Paper Code : IT-503

OPERATING SYSTEM

Time Allotted : 3 Hours   *Full Marks* : 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for the following :

$$10 \times 1 = 10$$

i) Which one in the following is NOT shared by the threads of the same process ?

a) Stack   b) File Descriptor Table

c) Address Space   d) Message

ii) Important objectives of computer security include

a) Confidentiality   b) Integrity

c) Availability   d) All of these.

iii) Which of the following reduces degree of multiprogramming ?

a) Long Term Scheduler

b) Medium Term Scheduler

c) Short Term Scheduler

d) All of these.

iv) In a resident OS computer, which of the following systems must reside in the main memory under all situations ?

a) Assembler   b) Loader

c) Linker   d) Compiler.

v) In order to implement mutual exclusion on a critical resource for competing processes, only one program at a time should be allowed

a) in the critical section of the program

b) to perform message passing

c) to exhibit cooperation

d) none of these.

vi) In a tree-structured directory, the series of directory names that culminates in a file name is referred to as the

a) Path name   b) Working Directory

c) Symbolic name   d) None of these.

vii) A memory page containing a heavily used variable that was initialized very early and is in constant use is removed when .... page replacement algorithm is used.

   a)   LRU   b)   LFU

   c)   FIFO   d)   none of these.

viii) The main purpose of OS is

   a)   to provide users an environment to execute programs

   b)   to manage computer resources

   c)   both (a) & (b)

   d)   none of these.

ix) With segmentation, if there are 64 segments and maximum segment size is 512 words, the length of bits in logical address is

   a)   12   b)   15

   c)   14   d)   16.

x) TLB is a kind of

   a)   Virtual memory   b)   Interrupt

   c)   Cache   d)   Main memory.

GROUP – B
(Short Answer Type Questions)
Answer any *three* of the following. $3 \times 5 = 15$

2. What is Semaphore ? Differentiate between Binary & Counting Semaphores.

3. What is the main objective of Multiprogramming ? Draw and describe process state transitions.

4. Categorize different types of attackers in the context of security.

5. What is the problem of fragmentation and how can it be solved ?

6. Why are page sizes always powers of 2 ? What is the difference between logical and physical addresses ?

                                      2 + 3

GROUP – C
(Long Answer Type Questions)
Answer any *three* of the following. $3 \times 15 = 45$

7. a)   What do you mean by scheduler ? Explain different types of scheduler. Explain cpu scheduling criteria.

b) For the process listed in the table, draw a chart illustrating their execution using FCFS. SJF, SRTF (SRJF). Round Robin (quantum = 2) and calculate average turn around time and average waiting time :

Process	Arrival Time	Processing Time
A	0	8
B	1	4
C	2	9
D	3	5

1 + 3 + 3 + 8

8. a) What is critical section problem ? What are the requirements a critical section problem must satisfy ?

b) What is deadlock ? What are the necessary conditions for deadlock to occur ?

c) Consider a system with five processes P0 through P4 and have three resource types A, B, C. Find out the number of instances of each resource type and retrieve the safe sequence where :

	MAX			NEED			AVAILABLE		
	A	B	C	A	B	C	A	B	C
P0	7	5	3	7	4	3	2	3	0
P1	3	2	2	0	2	0			
P2	9	0	2	6	0	0			
P3	2	2	2	0	1	1			
P4	4	3	3	4	3	1			

1 + 3 + 1 + 4 + 6

9. a) State producer-consumer problem. Give a solution to the producer-consumer problem using semaphore. Justify your solution guarantees Mutual Exclusion.

b) What is paging ? Differentiate between internal and external fragmentations. What is thrashing ?

c) What is TLB ? What do you mean by "Belady's Anomaly" ?

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d) Having 3 physical memory frames show the behaviour of LRU and FIFO and optimal page replacement algorithm for the page address string like :

2, 3, 2, 1, 5, 2, 4, 5, 3, 2, 5, 2.

$$1 + 2 + 2 + 1 + 2 + 1 + 6$$

10. a) What is a record in a file ? For a file having multiple records what are the different indexing strategies there ? Explain each strategy very briefly with relative advantages and disadvantages.

   b) Draw the disk road/write head movement diagram for SSTF, SCAN, CSCAN and FIFO, for the track requests as :

   25, 75, 35, 100, 95, 175, 78, 125, 90, 25.

   $$1 + 2 + 4 + 8$$

11. Write short notes on any *three* of the following : 3×5

   a) Process Control Block

   b) Scan and C-Scan algorithm

   c) Aging Technique

   d) External Fragmentation & Internal Fragmentation.