Roll No. | | | | | | | |

H

TCS–503/TIT–503

B. Tech. (CS/IT) (Fifth Semester)
End Semester EXAMINATION, 2017
OPERATING SYSTEM

Time : Three Hours] [*Maximum Marks : 100*

Note : (i) This question paper contains *five* questions.

(ii) All questions are compulsory.

(iii) Instructions on how to attempt a question are mentioned against it.

(iv) Total marks assigned to each question are **twenty.**

1. Attempt any *two* questions of choice from (a), (b) and (c). (2×10=20 Marks)

   (a) What is the purpose of interrupts ? What are the differences between a trap and an interrupt ? Can traps be generated by a user program ? Explain the purpose with an example.

(b) Define a Thread. Give the benefits of multithreading. What resources are used when a thread is created ? How do they differ from those used when a process is created ?

(c) What is virtual memory ? Discuss the benefits of virtual memory technique.

2. Attempt any *two* questions of choice from (a), (b) and (c). (2×10=20 Marks)

(a) In your own words justify what a critical section is ? State different conditions which provide a solution to critical section. Give an example for this.

(b) Explain the process state diagram by making a neat labelled diagram and explain the working of each and every step.

(c) By considering following parameters and using FCFS policy find the Average turn around time, Average waiting time, average response time, Throughput and CPU utilization :

Process	Burst Time	Arrival Time	I/O Burst
P1	5, 7	0	10
P2	3, 2	1	8
P3	1, 1	2	8

3. Attempt any *two* questions of choice from (a), (b) and (c). (2×10=20 Marks)

(a) Five philosophers are sitting at round table. In the center of the table is a bowl of rice. Between each pair of philosophers is a single chopstick. A philosopher is in one of three states : thinking, hungry or eating. At various times, a thinking philosopher gets hungry. A hungry philosopher attempts to pick up one of the adjacent chopsticks, then the other (not both at the same time). If the philosopher eats for a period of time. After eating, the philosopher puts the chopstick down and returns to thinking. Write a monitor for the dinning philosopher problem.

(b) Write the various conditions for Deadlock. By using deadlock avoidance state whether the system is in safe state or not.

Process	Allocation				Max				Available			
	A	B	C	D	A	B	C	D	A	B	C	D
P1	0	0	1	2	0	0	1	2				
P2	1	0	0	0	1	7	5	0				
P3	1	3	5	4	2	3	5	6	1	5	2	0
P4	0	6	3	2	0	6	5	2				
P5	0	0	1	4	0	6	5	6				

(c) A weather station computer system automatically predicts the weather based on input from three measuring devices. Each measuring device is running a separate process that performs some observation and when finished, places the data into a SHARED buffer. When all three measuring processes have placed their observations into the buffer a calculation process is signaled. The calculation process takes the observations, performs some calculation and predicts the weather. All the four processes are started at the same time. All the measuring processes use the following code :

```
Void main( )
{
shared_Buffer*buffer;
Result*results;
results=make_observation( );
add_observation( buffer, results);
}
```

The calculation process uses the following code :

```
Void main( )
{
shared_buffer * buffer;
```



```
Results *results1, *results2, *results3;
get_results(buffer, results1, results2, results3);
calculate(results1, results2, results3);
}
```

Using semaphores modify the above code so that mutual exclusion on the shared buffer is guaranteed and it forces the calculation process to wait for the observation processes to finish.

4. Attempt any *two* questions of choice from (a), (b) and (c). (2×10=20 Marks)

(a) Explain the concept of Paging. On a system using paging and segmentation, the virtual address space consists of up to 8 segments where each segment can be up to 2^29 bytes long. The hardware pages each segment into 256-byte pages. How many bits in the virtual address specify the :

(i) Segment number ?

(ii) Page number ?

(iii) Offset within page ?

(iv) Entire virtual page ?

(b) Given memory partition of 100K, 500K, 200K, 300K and 600K(in order), how would each of the First-fit, Best-fit, and Worst-fit

algorithms place processes of 212K, 417K, 112K and 426K (in order) ? Which algorithm makes the most efficient use of memory ?

(c) What is Thrashing ? What is the cause of Thrashing ? How does the system detect Thrashing ? What can the system do to eliminate this problem ?

5. Attempt any *two* questions of choice from (a), (b) and (c). (2×10=20 Marks)

(a) A file system uses 512-byte physical blocks. Each file has a directory entry giving the file name, location of the first block, length of file, and last block position. Assume the last physical block read and the directory entry are already in main memory. Indicate how many physical blocks must be read to access the specified block (including the reading of the specified block) on a :

(i) system using contiguous allocation.

(ii) repeat the above problem for a system using linked allocation.

(iii) repeat the above problem for a system using indexed allocation.

(b) On a disk with 1000 cylinders numbers 0 to 999, compute the number of tracks the disk arm must move to satisfy all the requests in the disk queue. Assume the last request

serviced was at track 345 and the head is moving toward track 0. The queue in FIFO order contains requests for the following tracks :

123, 874, 692, 475, 105, 376

Perform the computation for the following scheduling algorithm :

(i) FIFO

(ii) SSTF

(iii) SCAN

(iv) LOOK

(v) C-SCAN

(vi) C-LOOK

(c) Write in detail about file attributes, operations and types and structures.