H

TCS-503

B. TECH. (CSE) (FIFTH SEMESTER) END SEMESTER EXAMINATION, 2019

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 for each main question are twenty.
- 1. Attempt any two parts of choice from (a), (b) and (c).

 $(10\times2=20 \text{ Marks})$

- (a) Answer the following:
 - (i) What is the basic goal of operating system? Give various criteria and state how they help in getting best performance out of operating system. (5 Marks)
 - (ii) Discuss the various types of operating systems. List at least two specifications of each type. (5 Marks)
- (b) An operating system uses the Shortest Remaining Time First (SRTF) process scheduling algorithm. Consider the arrival times and execution times for the following processes:

Process	Burst Time	Arrival Time
P1	20	0
P2	25	15
P3	10	30
P4	15	45

Calculate following:

- (i) Draw a Gantt chart for SRTF. (3 Marks)
- (ii) What is the total waiting time for process P2? (2 Marks)
- (iii) Calculate the average turn-around time. (3 Marks)
- (iv) Calculate CPU utilization and throughput. (2 Marks)
- (c) (i) Discuss Kernels and System calls. (5 Marks)
 - (ii) What is Virtual Machine? Give some advantages of virtual machines. Also draw appropriate diagram in support of your answer. (5 Marks)
- 2. Attempt any two parts of choice from (a), (b) and (c). (10×2=20 Marks)
 - (a) Write short notes on the following:
 - (i) Process state (5 Marks)
 - (ii) Context switch (5 Marks)
 - (b) What do you understand from the term "Operating System Structure"? Elaborate its different approaches along with suitable neat, clean and labelled diagrams.
 - (c) Consider the following set of processes, with the length of CPU given in milliseconds:

Process	Burst Time	Priority
P1	8	4
P2	6	1
P3	1	2
P4	9	2
P5	3	3

The processes are assumed to have arrived in the order P1, P2, P3, P4, P5 all at time 0.

(i) Draw Gantt charts for the Priority (Non-preemptive) and R-R scheduling algorithms. (4 Marks)

- (ii) What is the waiting time of each process and average waiting time for each of these scheduling algorithms? (3 Marks)
- (iii) What is the average turn-around time of each scheduling algorithms? (3 Marks)
- 3. Attempt any two parts of choice from (a), (b) and (c). (10×2=20 Marks)
 - (a) Answer the following:
 - (i) Differentiate between Cooperative and Independent processes.

(5 marks)

- (ii) Race condition (Explain with the help of an example). (5 marks)
- (b) What is Critical Section problem? State Readers-Writers problem and give a solution. Also show that given solution satisfies all the requirements of a solution for critical section problem.
- (c) Consider the following snapshot of a system:

Allocation					Max			Available				
	·A	В	C	D		A	В	C	D	A B	C	D
P1	1	2	2	1		3	3	2	2	3 1	1	2
P2	1	0	3	3		1	2	3	4			
P3	1	2	1	0	1	1	3	5	0			

Answer the following questions using Banker's algorithm:

- (i) What is the content of matrix need?
- (ii) Is the system in safe state? If no, explain the reason. If yes, give the safe sequence.
- (iii) If a process from P1 arrives for (1, 1, 0, 2), can the request be granted immediately.
- 4. Attempt any two parts of choice from (a), (b) and (c). (10×2=20 Marks)
 - (a) Explain the following terms:
 - (i) Logical and Physical Address Space
 (ii) Swapping
 (iii) Thrashing
 (2 Marks)
 - (iv) Demand segmentation (2 Marks)

(b) Consider the following page reference string:

How many page faults will occur, if there are three frames and initially all are empty, using LRU, Optimal and FIFO Page replacement?

- (c) Given five memory partitions of 100 Kb, 500 Kb, 200 Kb, 300 Kb, 600 Kb (in order), how would the first-fit, best-fit and worst-fit algorithms place processes of 222 Kb, 419 Kb, 110 Kb and 420 Kb (in order)? Which algorithm makes the most efficient use of memory?
- 5. Attempt any two parts of choice from (a), (b) and (c). (10×2=20 Marks)
 - (a) Explain all types of directory structures using neat and labelled diagrams.
 - (b) Suppose that a disk drive has 5000 cylinders, numbered 0 to 4999. The drive is currently serving a request at cylinder 135 and the previous request was at cylinder 125. The queue of pending requests, rn FIFO order is:

Calculating from initial request, what is the total distance (in cylinders) that the disk arm moves to satisfy all the pending requests for each of the following disk-scheduling algorithms?

- (i) LOOK
- (ii) SCAN
- (iii) FCFS
- (iv) C-LOOK
- (c) Why do we need to Allocation methods? Explain the various types of allocation methods with proper diagrams. Also state which method is better and why?

TCS-503

280