Total No. of printed pages = 6

Co-505/OS/5th Sem/Comp/2017/M

OPERATING SYSTEM

Full Marks – 70

Pass Marks – 28

Time – Three hours

The figures in the margin indicate full marks for the questions.

Answer question No.1 and any *four* questions from the rest.

1. (a) State true or false : 1×5=5

(i) A CPU bound process generates I/O request frequently.

(ii) The FCFS scheduling algorithm is non-preemptive.

(iii) In batch system, jobs are executed in a sequential manner.

(iv) Segmentation permits physical address space of process to be non-contiguous.

[Turn over

(v) System calls provide an interface between processes and operating system.

(b) Fill up the blanks : 1×5=5

(i) A _____ is a program in execution.

(ii) If there is no _____ in the Resource Allocation Graphs, it indicates that no deadlock exists.

(iii) Virtual memory technique is implemented by _____ paging.

(iv) Paging memory management scheme suffers from _____ fragmentation.

(v) Critical section refers to the code segment of a process where it accesses a _____ resource.

2. (a) Define process. What is process state ? Explain with the help of a diagram. 7

(b) Write an algorithm to solve critical section problem for 2 processes. Prove that the algorithm satisfies all three requirements for the critical section problem. 8

3. (a) With reference to the following set of processes, determine Average Waiting Time and Average Turnaround Time, using the following scheduling algorithms : 10

(i) FCFS

(ii) SJF

(iii) Priority based (Preemptive)

(iv) Round Robin.

Make use of Gantt Charts. Lower number means higher priority i.e. process with priority 1 has higher priority than process with priority 2. In case of tie, use FCFS to break the tie. Time slice for Round Robin scheduling is 4 ms.

Process	Arrival Time(ms)	Next CPU Burst(ms)	Priority
P1	00	14	07
P2	01	07	01
P3	03	02	03
P4	05	08	02

(b) What are the performance criteria for CPU scheduling algorithms. 5

4. (a) Under what circumstances do page faults occur ? Describe with the help of diagram the actions taken by the operating system when a page fault occurs. 11

(b) Write the four necessary conditions that cause deadlock in a system. 4

5. (a) Consider the following snap-shot of a system : 10

Current state :

Process	Allocated			
	R1	R2	R3	R4
P1	0	0	1	2
P2	2	0	0	0
P3	0	0	3	4
P4	2	3	5	4
P5	0	3	3	2

Max				Available			
R1	R2	R3	R4	R1	R2	R3	R4
0	0	1	2	2	1	0	0
2	7	5	0				
6	6	5	6				
4	3	5	6				
0	6	5	2				

(i) Compute NEED Matrix.

(ii) Is the system in safe state ? Justify.

(iii) Is the system deadlocked ? Justify the answer.

(iv) Can a request (0, 1, 0, 0) from P3 be safely granted immediately ? Justify the answer. Show the system state after grant of request.

(b) Explain the SCAN scheduling algorithm considering a disk queue with requests for I/O to blocks on cylinders : 98, 183, 37, 122, 14, 124, 65, 67 5

6. (a) Discuss the contiguous allocation method of allocating disk space stating its advantages and disadvantages. 7

(b) Explain the processor pool model of Distributed Operating System. 8

7. Write short notes on any *three* : 5×3=15

(i) DMA

(ii) Belady's Anomaly

(iii) Semaphore

(iv) Monitor

(v) Interprocess Communication

(vi) Time Sharing System.