B. E. Fifth Semester (Computer Technology)/SoE–2014–15 Examination

Course Code : CT 1302/CT 302   **Course Name : Operating Systems**

Time : 3 Hours]   [Max. Marks : 60

Instructions to Candidates :—

    (1)   All questions are compulsory.

    (2)   All questions carry marks as indicated.

    (3)   Due credit will be given to neatness and adequate dimensions.

    (4)   Assume suitable data wherever necessary.

    (5)   Illustrate your answers wherever necessary with the help of neat sketches.

1.   (A)   Solve the following:-

    (A1) Compare and contrast.

        (i)   Parallel system and distributed systems.

        (ii)   Hard real time and soft real time.

        (iii) Multiprogramming and multiprocessing.   6(CO1)

    (A2) Operating system is called as resource manager.Justify. 2(CO1)

    (A3) Justify the role of system call.   2(CO1)

OR

    (B1) Give the essential properties of the following types of OS.

        (i)   Batch Operating System.

        (ii)   Real time system.

        (iii) Network operating system.   6(CO1)

    (B2) Elaborate the need of services provided by an operating system.
        2(CO1)

    (B3) Why is Spooling necessary for multiprogrammed Batch system ?
        2(CO1)

2. (A) Solve the following.

(A1) Calculate the average waiting time and average turnaround time for following situation:-

Assume quantum of 2 ms:

Process	Burst Time	Priority	Arrival Time
P1	5	1	1
P2	7	3	5
P3	6	7	0

Give Gantt chart and calculate Avg. Turnaround Time and Waiting Time for:

(i) Preemptive Priority.

(ii) SRTF   6(CO2)

(A2) Compare between Multilevel queue and Multilevel feedback queue scheduling.   2(CO2)

(A3) Give the significance of Process Control Block.   2(CO2)

OR

(B1) Consider the following set of process with the length of CPU burst time in milliseconds :-

Process	Burst Time	Priority
P1	7	3
P2	9	2
P3	2	1
P4	1	4
P5	3	5

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

(a) Draw Gantt chart, illustrating the execution of these processes using FCFS,SJF,and RR (quantum=1) scheduling.   6(CO2)

(b) What is turn around time of each process for each of the following scheduling algorithm in part A ?

(c) What is the waiting time for each process for each of the scheduling algorithms in part A ?

(d) Which of the schedule in part A, results in the minimal average waiting time (overall process) ?   6(CO2)

(B2) Differentiate preemptive from non-preemptive scheduling. 2(CO2)

(B3) Elaborate the need of Context Switching in detail.   2(CO2)

3. (A) Solve the following.

(A1) Assume that you have 5 cooperating processes. Construct a scenario wherein they execute one after another. You have to solve the problem using semaphore. Insert wait and signal suitably in the process code and illustrate the solution (Note: order is P3-> P2-> P4-> P1-> P5)   6(CO2)

(A2) Give a solution to solve critical section problem.   2(CO2)

(A3) Elaborate race condition in detail.   2(CO2)

OR

(B1) Justify the need of Process Synchronization. Give a solution to solve producer-consumer problem.   6(CO2)

(B2) Give Peterson's solution for process synchronization.   2(CO2)

(B3) Give the significance of Monitors.   2(CO2)

4. (A) Solve the following.

(A1) Consider the following snapshot of a system.

|	Allocation				Max				Available			
	A	B	C	D	A	B	C	D	A	B	C	D
P0	0	0	1	2	0	0	1	2	1	5	2	0
P1	1	0	0	0	1	7	5	0				

Contd..

P2 1 3 5 4   2 3 5 6

P3 0 6 3 2   0 6 5 2

P4 0 0 1 4   0 6 5 6

Answer the following questions using the banker's algorithm :

(i)   What is the content of matrix "Need" ?

(ii) If a request from process P1 arrives for (0,4,2,0), can the request be granted immediately ?   6(CO3)

(A)   (A2) How deadlock can be recovered ?   2(CO3)

(A3) Elaborate the main characteristics of capability lists.   2(CO3)

OR

(B)   (B1)
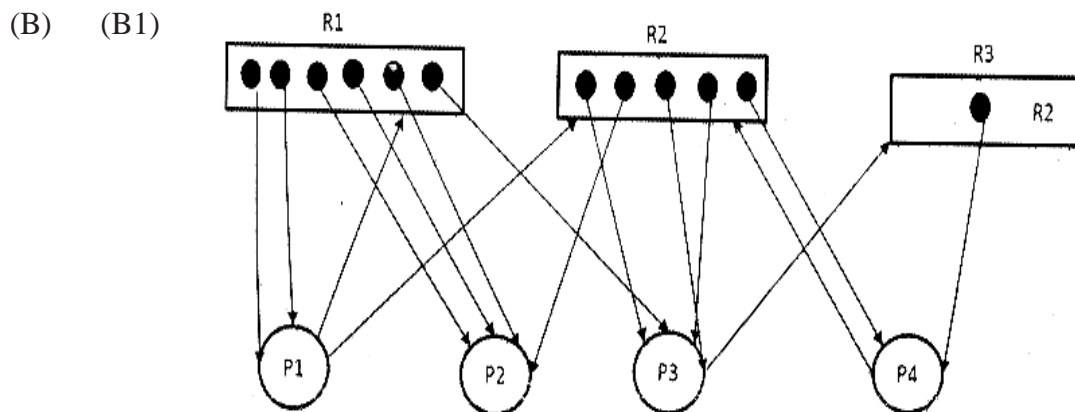
Consider the resource allocation graph in the figure.

(i)   Find a system is in dealock state.

(ii) If not,find a safe sequence.   6(CO3)

(B2) Design Resource allocation graph where system is in safe state where there are 2 resources having 2 instances and 3 processes.   2(CO3)

(B2) State any two real life examples for showing Deadlock situation.   2(CO3)

5. (A) Solve the following:-

(A1) Consider the following page reference string.

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

For a memory with three frames. How many page fault would occur for following replacement algorithm.

(i)   LRU replacement

(ii) Optimal replacement.   6(CO4)

(A2) Give the significance of Overlay.   2(CO4)

(A3) Why paging is faster than segmentation ?   2(CO4)

OR

(B) (B1) Give memory partition of 100K, 500K, 200K, 300K and 600K (in order). How would each of the first fit, best fit and worst fit algorithm place process of 212k,417k,112k, and 426k (in order) ? Which algorithm makes the most efficient use of memory ? 6(CO4)

(B2) When do Belady's anomaly occurs ?   2(CO4)

(B3) How the problem of external fragmentation can be solved ?
                                                              2(CO4)

6. (A) Solve the following :-

(A1) Suppose the head of moving- head disk with 200 tracks, numbered 0 to 199 is currently serving a request at track 143 and has just finished a request at track 125. if the queue of requests is kept in the FIFO order

86, 147, 91, 177, 94, 150, 100, 175, 130

What is total head movement to satisfy these request for the following disk scheduling algorithms ?

(i)   SSTF

(ii) SCAN

        (iii) FCFS   6(CO5)

(A2) Compare Linked and Indexed allocation.   2(CO5)

(A3) What are the physical addresses for the following logical addresses?

        (i)   0,430

        (ii)   2,500   2(CO5)

OR

(B) (B1) Suppose that a disk drive has 2000 cylinders. The drive is currently serving a request at cylinder 190 and the previous request was at cylinder 145. The queue of pending request,in FIFO order is.

        86, 1890, 913, 1679, 945, 1500, 1020,1745,180.

        Starting from the current head position, what is the total distance (in cylinder) that disk arm moves to satisfy all the pending requests for each of the following disk scheduling algorithms ?

        (i)   FCFS

        (ii)   SSTF

        (iii) LOOK   6(CO5)

(B2) Can a direct access file be read sequentially ? Justify.

                                              2(CO5)

(B3) What are the pieces of information associated with open file? Explain each of them.   2(CO5)