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Roll No

DOON UNIVERSITY, DEHRADUN

Final Semester Examination, Third Semester, Dec-2015

School of Technology

MCA (Integrated) Program

Course: STM-520 [Operating Systems]

Time Allowed: 3Hours *Maximum Marks: 50*

Note: Question paper is divided into three sections A, B & C. Attempt all the questions. Marks distribution is given alongside. Follow the instruction as given in each section.

SECTION: A

[Total Marks in this section=10]

Que-1 Define the following terms **(1+1+1+1)**

(i) PCB
(ii) Garbage collection
(iii) Demand paging
(iv) External fragmentation

Que-2 **(1+1+1+1+1+1)**

(i) The most optimal scheduling algorithm is _____.

(ii) The real difficulty with SJF in short term scheduling is :

(a) it is too good an algorithm (b) knowing the length of the next CPU request
(c) it is too complex to understand (d) None of these

(iii) Physical memory is broken into fixed-sized blocks called _____.

(iv) Every address generated by the CPU is divided into two parts _____ and _____

(v) Belady anamoly occurs in_____

(vi) What do you understand by Lazy Swapper?

SECTION: B

[Total Marks in this section=20]

Que-3 Consider the following Reference String. **(2+2)**

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

How many page faults would occur for the following page replacement algorithms when given frame size is three?

i) Optimal Page Replacement

ii) FIFO Page Replacement

Que-4

(a) What is the problem with priority scheduling? How is it overcome? **(1+1)**

(b) What is a file? Describe the different file attributes. **(1+1)**

Que-5 With the help of a Gantt Chart for the following data calculate Average Waiting Time for a preemptive SJF and preemptive priority scheduling. Assume that a smaller priority number implies a higher priority. **(4)**

Process	Arrival Time (msecs)	Burst Time(msecs)	Priority
P1	0	6	4
P2	2	4	1
P3	4	3	2
P4	5	1	3

OR

What is address binding? What are three different address binding options? Draw the diagram also depicting the stages **(4)**

Que-6 Write the general structure of a critical section solution. Write a solution to Readers-writers problem using semaphores. Explain. **(1+3)**

OR

Consider a system consisting of m resources of the same type, being shared by n processes. Resources can be requested and released by processes only one at a time. Show that the system is deadlock-free if the following two conditions hold:

(i) The maximum need of each process is between 1 and m resources

(ii) The sum of all maximum needs is less than m + n **(2+2)**

Que-7 Clearly show that with the general definition of semaphores with busy waiting, the value is never negative but with spinlock may have negative semaphore values. **(4)**

OR

Explain segmentation. Consider the following segment table:

Segment	Base	Length
0	200	600
1	1200	20
2	40	150

What are the physical addresses for the following logical addresses?
(i) 1, 30 (ii) 2, 100 (iii) 4, 10 (iv) 0, 412

SECTION: C
[Total Marks in this section=20]

Que-8

(a) Given the memory partitions of 100k, 500k, 200k, 300k and 600k (in order). How would the worst fit and best fit algorithms place processes of 212k, 417k, 112k and 426k (in order)? **(1+1)**

(b) List out and explain the different criteria that have been suggested for comparing CPU scheduling algorithms. **(3)**

Que-9

(a) Explain the various scheduling queues used in process scheduling with a neat Queuing diagram. **(2)**

(b) Explain the following terms. **(3)**

(i) Medium Term Scheduler.
(ii) Job Scheduling
(iii) CPU Scheduling

Que-10

(a) With the help of diagrams, explain the current activities of a process when it executes and PCB of that process. **(3)**

(b) Draw a resource allocation graph for the following scenario and determine whether the system is in a deadlock or not. Justify your answer. **(2)**

P = {P1, P2, P3}
R = {R1, R2, R3, R4}
No. of instances of R1, R2, R3 and R4 are 1, 2, 1 and 3 respectively.
E = {P1 → R1, R1 → P2, R2 → P1, R2 → P3, P2 → R3, P2 → R2, R3 → P3, R4 → P3}

Que-11 Suppose that a disk drive has 200 cylinders, numbered 0 to 199. disk head is initially at cylinder 53. the disk queue has the following request for I/O to blocks on cylinders:98, 183, 37, 122, 14, 124, 65, 67. Indicate the total head movement using the following disk scheduling algorithms:
i) SCAN ii) LOOK iii) C-SCAN iv) C-LOOK v) FCFS **(5)**