RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College affiliated to University of Calcutta)

B.A./B.Sc. THRID SEMESTER EXAMINATION, MARCH 2022

SECOND YEAR [BATCH 2020-23]

Date : 05/03/2022 **COMPUTER SCIENCE (Honours)**

Time : 11 am – 1 pm **Paper : VI [CC6]** Full Marks : 50

Answer **any five** questions of the following: [5×10]

1. a) What do you mean by front end and back end of a compiler?

   b) Write down the functions performed by a loader.

   c) Write a short note on various types of kernel designs. (3+3+4)

2. a) Consider the following set of processes with arrival time and CPU burst time given in milliseconds:

Process	Arrival Time	Burst Time
1	0	7
2	1	5
3	2	3
4	3	2
5	4	1
6	5	3

   What is the average turnaround time for these processes with *shortest remaining time first* (SRTF)?

   b) What do you mean by abnormal termination of processes?

   c) Describe the actions taken by a kernel to context switch between processes. (5+2+3)

3. a) Consider the following statements:

   S1: a = x+y

   S2: b = y+1

   S3: c = a+b

   S4: d = c+1

   S5: e = c+d

   Schedule the statements with necessary semaphores so that maximum parallelism is achieved.

   b) What do you mean by mutex lock?

   c) Compare independent and co-operating process. (5+3+2)

4. a) Show how improper use of wait and signal operation can lead to critical section problem?

   b) Consider a system having ‘m’ resources of same type. The resources are shared by 4 processes P0, P1, P2 and P3 which has peak time demands of 3, 4, 6, and 5 respectively. What would be the minimum value of m that ensures that deadlock will never occur?

   c) With an example show how deadlock can be avoided using resource allocation graph. (3+4+3)

5. a) Explain absolute code and relocatable code.

   b) A system has 1000k of main memory. The job arrives and finishes in the following sequence:

   Job1 requiring 200k arrives -> Job2 requiring 350k arrives -> Job3 requiring 300k arrives -> Job1 finishes->Job4 requiring 120k arrives -> Job5 requiring 150k arrives-> Job6 requiring 80k arrives. Which among *First Fit* and *Best Fit* performs better for this sequence?

   c) What is the page protection scheme using valid-invalid bit? (3+5+2)

6. a) In a simple paging system, with 2^{24} bytes of logical memory, 256 pages at physical address space and a page size 2^{10} bytes, how many bits are there in physical address?

   b) What is demand paging?

   c) Explain Enhanced Second Chance page replacement algorithm. (4+2+4)

7. a) Disk requests come to a disk driver for cylinders 10, 22, 20, 2, 40, 6 and 38, in that order at a time when the disk drive is reading from cylinder 20. The seek time is 6 ms per cylinder.

   i) Calculate the total seek time, if the disk arm scheduling algorithm is FCFS.

   ii) If the scheduling algorithm is closest cylinder next, then calculate the total seek time.

   b) What do you mean by RAID?

   c) What is the utility of Network Attached Storage (NAS)? [(2+3)+2+3]

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