

2014

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[This question paper contains 4 printed pages.]

Sr. No. of Question Paper : 6086

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Your Roll No.....

Unique Paper Code : 234401

Name of the Course : B.Sc. (H) Computer Sc.

Name of the Paper : Operating System (CSHT-408)

Semester : IV

Duration : 3 Hours

Maximum Marks : 75

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Section A is compulsory.
3. Attempt any 4 questions from Section B.
4. Attempt parts of a question together.

SECTION - A

1. (a) What is the main advantage for an operating system designer of using virtual machine architecture ? (2)

- (b) Explain what will be the output at LINE A in the following program :

```
#include <sys/types.h>
#include <stdio.h>
#include <unistd.h>
int value = 5;
int main()
{
pid_t pid;
pid = fork();
if (pid == 0) {
value = value + 15;
return 0;
}
```

P.T.O.

```

else if (pid > 0) {
    wait (NULL);
    printf("PARENT: value = %d", value); /* LINE A */
    return 0;
}
}

```

(3)

2. Suppose the following processes arrive for execution at the times indicated. In answering the questions, use non-preemptive scheduling.

Process	Arrival Time	Burst Time
P_1	0.0	8
P_2	0.4	4
P_3	1.0	1

- (a) What is the average turnaround time for these processes with the FCFS scheduling and SJF scheduling algorithms (both pre-emptive and non-preemptive).
- (b) Compute what will be the average turnaround time if the CPU is left idle for the first one unit and then SJF scheduling is used? (6+3)
3. (a) Differentiate between asynchronous and deferred cancellation of threads. (3)
- (b) Given two sets
- $$P = \{P_1, P_2, P_3, P_4\}$$
- $$R = \{R_1, R_2\}$$
- Two instances of resource type R_1 and R_2 each exist in the system.
- $$E = \{P_1 \rightarrow R_1, R_1 \rightarrow P_2, R_1 \rightarrow P_3, R_2 \rightarrow P_1, P_3 \rightarrow R_2, R_2 \rightarrow P_4\}$$
- Draw a resource allocation graph and describe whether the system can go into a deadlock state or not? (5)
- (c) Assume a paging system with a page size of 1 KB, compute the page numbers and offsets with these logical addresses (provided as decimal numbers).
- (i) 2375
 - (ii) 19366
 - (iii) 256
- (3)

4. (a) Given references to the following pages by a program,

9, 0, 1, 4, 1, 8, 7, 8, 7, 1, 2, 4, 3, 4, 2, 7, 8, 2, 8, 3

How many page faults will occur if the program has four page frames available to it and uses :

- (i) Optimal replacement (ii) LRU replacement (6)

- (b) Suppose that a disk has 1,000 cylinders numbered 0 to 999. The disk head is currently at cylinder 943 and previous request was at 125. The queue of pending requests in FIFO order is :

86, 470, 913, 77, 948, 509, 130, 15, 500, 433.

Calculate and show total head movements for the following disk scheduling algorithms :

- (i) FCFS (ii) SCAN (4)

SECTION – B

5. (a) How does dual mode help in protecting the operating system ? (3)

- (b) In what way a micro-kernel approach provides the ease of extending the operating system ? Name two operating systems which use micro-kernel approach. (3)

- (c) Consider a logical address space of 32 pages with 1024 words per page, mapped onto a physical memory of 16 frames.

(i) How many bits are required in the logical address ?

(ii) How many bits are required in the physical address ? (4)

6. (a) Name the resources used when a thread is created. (2)

- (b) Differentiate among short-term, medium-term and long-term scheduling. (4)

- (c) Explain the four necessary conditions that must exist simultaneously for a deadlock situation to arise ? (4)

7. (a) Consider a demand-paging system with the following time-measured utilizations :

CPU utilization : 20%

Paging disk : 97.7%

Other I/O devices : 5%

For each of the following, say whether it will (or is likely to) improve CPU utilization. Explain your answers.

- (i) install a faster CPU
 - (ii) install a bigger paging disk
 - (iii) increase the degree of multiprogramming
 - (iv) install more main memory (6)
- (b) What information is contained in on-disk structure to implement a file system ? (4)
8. (a) Why is non-contiguous memory allocation better than contiguous memory allocation ? (3)
- (b) List the advantages and disadvantages of acyclic graph directories. (4)
- (c) Describe file system mounting. (3)
9. (a) List the steps for handling page fault in virtual memory implementation. (6)
- (b) How sharing is implemented among multiple processes using paging technique ? (4)
10. (a) Write notes on :-
- (i) man-in-the-middle attack
 - (ii) Worms (3+3)
- (b) Explain domain of protection. (4)