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52 (3) OPSY IT 3.1 / ITB-HC-3026

2021

(Held in 2022)

OPERATING SYSTEM

Paper : IT 3.1 / ITB-HC-3026

Full Marks : 60

Time : Three hours

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

1. Answer **any seven** questions : $3 \times 7 = 21$

(a) Define Operating Systems and discuss its role from different perspectives.

(b) What do you mean by cooperating process ? Describe its *four* advantages.

(c) Distinguish among the following terminologies :

(i) Multiprogramming systems

(ii) Multitasking systems

(iii) Multiprocessor systems.

Contd.

- (d) What are system calls? Explain different categories of system calls with example.
- (e) Write a brief note on different operating system structures.
- (f) What are the *three* major activities of an operating system in regard memory management?
- (g) Justify the statement "Operating System can be viewed as a government, resource allocator and a control program".
- (h) What is the purpose of command interpreter? Why is it usually separate from kernel?
- (i) What is scheduler? What is a dispatcher?
- (j) Give the information that is kept in process control block?

2. What is the difference between a preemptive and non-preemptive scheduling algorithms? Explain FCFS scheduling algorithm. Find the average turnaround time and average waiting time for the processes given in the table below : $1+2+3=6$

Process	CPU burst time (in ms)
P_1	24
P_2	3
P_3	3

3. Answer **any two** questions : $5 \times 2 = 10$

(a) Why is deadlock state more critical than starvation? Describe resource allocation graph with a deadlock, with a cycle but no deadlock.

(b) Describe the Bounded - Buffer problem and give a solution for the same using semaphores. Write the structure of producer and consumer processes.

(c) Memory partitions of 100kb, 500kb, 200 kb, 300kb, 600kb are available how would best, worst, first fit algorithm to place processes 212, 417, 112, 426 in order. Which is the best algorithm?

4. A virtual memory system has the following specification : Size of the virtual address space = 64k, Size of the physical address space = 4k, Page size = 512.

Virtual page#	Physical frame#
0	0
3	1
7	2
4	3
10	4
12	5
30	6
31	7

Find all the virtual addresses that will generate a page fault. Compute the main memory addresses for the following virtual addresses : 24, 3784, 10250, 30780. 8

5. What is DMA ? Explain the steps in a DMA transfer. 2+4=6
6. Discuss the following page replacement algorithm with an example — 6
- (i) Optimal
- (ii) LRU.
7. Write some advantages and disadvantages of virtual memory. 3