2023

COMPUTER SCIENCE

Paper : CSTHC3066

(Operating System)

Full Marks : 60
Pass Marks : 24

Time : 3 hours

The figures in the margin indicate full marks for the questions

1. Choose the correct answer from the following (any *five*) : 1×5=5

(a) What is operating system?

(i) Interface between the hardware and application programs

(ii) Collection of programs that manages hardware resources

(iii) System service provider to the application programs

(iv) All of the above

(b) CPU scheduling is the basis of

(i) multiprogramming OS

(ii) multiprocessor system

(iii) time-shared OS

(iv) batch OS

(c) How many necessary conditions are required for a deadlock situation?

(i) 5

(ii) 4

(iii) 3

(iv) 2

(d) _____ is a memory management scheme that permits physical address space of a process to be _____.

(i) Paging, contiguous

(ii) Paging, non-contiguous

(iii) Thrashing, non-contiguous

(iv) Thrashing, contiguous

(e) What is the mean of the booting in the operating system?

(i) Restarting computer

(ii) Install the program

(iii) To scan

(iv) To turn off

(f) Increase the efficiency of the system is related to

(i) device management

(ii) processor management

(iii) memory management

(iv) file management

(g) What does Kernel represent?

(i) Core component of OS

(ii) Software

(iii) It has access to hardware

(iv) All of the above

(h) ____ shows the process breakdown from complex to lower-level process.

(i) Process scheduling

(ii) Process hierarchy

(iii) Memory allocation

(iv) Inter-process communication

(i) Multiprogramming with variable partitioning is related to

(i) contiguous memory management

(ii) main memory that is not divided into partitions

(iii) process that is allocated a chunk of free space

(iv) All of the above

(j) Which one of the following is not an advantage of single-level directory structure?

(i) Its implementation is easy

(ii) Searching is faster for small-sized files

(iii) It facilitates back up and recovery

(iv) It facilitates non-grouping of same type of files

2. Answer any *five* of the following questions : 2×5=10

(a) Define race condition.

(b) Explain process state.

(c) Explain batch operating system.

(d) Define mutual exclusion in context of process.

(e) Define authentication and authorization.

(f) What is preemptive and non-preemptive scheduling algorithm?

(g) What do you mean by system call?

3. Answer any *five* of the following questions : 5×5=25

(a) Explain deadlock and all the necessary and sufficient condition for deadlock to occur.

(b) Explain file accessing methods.

(c) Differentiate between process and threads.

(d) Explain virtual memory.

(e) How can deadlock be avoided using resource allocation graph? Explain.

(f) Consider the following page reference string :

1, 2, 3, 4, 2, 1, 5, 6, 2, 1, 2, 3, 7, 6, 3, 2, 1, 2, 3, 6

How many page faults would occur for the following replacement algorithms, assuming four frames?

(i) FIFO replacement

(ii) Optimal replacement

(g) Explain critical section.

(h) Write a short note on process abstraction.

(i) What do you mean by user files directory (UFD)? Explain with a diagram.

4. Answer any *two* of the following questions : 10×2=20

(a) Consider the following snapshot of a system :

	Allocation			*Max*			*Available*		
	A	*B*	*C*	*A*	*B*	*C*	*A*	*B*	*C*
P_0	0	1	0	7	5	3	3	3	2
P_1	2	0	0	3	2	2	—	—	—
P_2	3	0	2	9	0	2	—	—	—
P_3	2	1	1	2	2	2	—	—	—
P_4	0	0	2	4	3	3	—	—	—

where P_0 to P_4 are process and *A*, *B*, *C* are different resource types.

(Continued)

Answer the following questions using Banker's algorithm :

(i) What is the content of the matrix need?

(ii) Is the system a safe state? If yes, find the safe sequence.

(iii) If a request from P_1 arrives for (1, 0, 2), can the request be granted immediately? If yes, find the safe sequence.

(b) Explain different file operations.

(c) Explain semaphores and its usage.

(d) Discuss various policy mechanisms with respect to protection and security.

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