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Total No. of Printed Pages: 2

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BBA (Semester – 6th)
OPERATING SYSTEMS
Subject Code: BCSE0F94
Paper ID: [OE2150123]

Time: 03 Hours

Maximum Marks: 60

Instruction for candidates:

1. Section A is compulsory. It consists of 10 parts of two marks each.
2. Section B consist of 5 questions of 5 marks each. The student has to attempt any 4 questions out of it.
3. Section C consist of 3 questions of 10 marks each. The student has to attempt any 2 questions.

Section – A

(2 marks each)

Q1. Attempt the following:

- a. What is an operating system and its main purpose? Write services provided by OS.
- b. What do you mean by a process? What are the different states of a process?
- c. What are the four necessary and sufficient conditions behind the deadlock?
- d. What is semaphore? How binary semaphore is different from counting semaphores?
- e. What is a system call in operating systems? Explain types of system calls.
- f. What is Process Control Block?
- g. How user level threads are different from kernel level threads?
- h. What is the difference between dispatcher and scheduler?
- i. What is paging in operating systems?
- j. What is a device register, and how does it relate to device management?

Section – B

(5 marks each)

- Q2. What is process synchronization in operating systems? Name its classical problems and explain any one in detail.
- Q3. Explain different methods of handling deadlocks. A system is having 3 user processes each requiring 2 units of resource R. Write minimum number of units of R that are required such that no deadlock will occur.
- Q4. What is the purpose of a page table, and how is it used in virtual memory management?
- Q5. The head of a moving head disk with 200 tracks, numbered 0 to 199, has just finished a request at track 125, and currently serving a request at track 143. The queue of requests is given in the FIFO order as 86, 147, 91, 177, 94, 150, 102, 175, 130. What will be the total number of head movements required to satisfy these requests for SCAN algorithm?

Q6. Consider the following table of arrival time and burst time for three processes P0, P1, P2:

Process	Arrival time	Burst time
P0	0 ms	7
P1	1 ms	3
P2	2 ms	7

The pre-emptive shortest job first scheduling algorithm is used. Scheduling is carried out only at arrival or completion of a process. What is the average waiting time for the three processes?

Section – C

(10 marks each)

Q7. Consider the 3 processes, P1, P2 and P3 shown in the table:

Process	Arrival time	Time Unit Required
P1	0	5
P2	1	4
P3	3	7

What will be the completion order of the 3 processes under the policies FCFS and RR2 (round robin scheduling with CPU quantum of 2 time units)?

Q8. What is a deadlock in an operating system? A system has n resources $R_0, \dots, R_{n-1}$, and k processes $P_0, \dots, P_{k-1}$. The implementation of the resource request logic of each process P_i is as follows:

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if (i % 2 == 0) {
    if (i < n) request  $R_i$ 
    if (i+2 < n) request  $R_{i+2}$ 
}
else {
    if (i < n) request  $R_{n-i}$ 
    if (i+2 < n) request  $R_{n-i-2}$ 
}

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What should be the value of n and k in which deadlock is possible?

Q9. Explain the different types of file systems, such as FAT, NTFS, and ext4 and process of file permission management in operating systems.