Professional Course Examination, November/December 2019

(3rd Semester)

BACHELOR OF COMPUTER APPLICATIONS

Course : BCA–303

(Operating Systems)

Full Marks : 75

Time : 3 hours

(PART : A—OBJECTIVE)

(*Marks* : 25)

The figures in the margin indicate full marks for the questions

SECTION—A

(*Marks* : 15)

Tick (✓) the correct answer in the brackets provided : 1×10=10

1. In a time-sharing operating system, when the time slot given to a process is completed, the process goes from the running state to the

(a) ready state ( )
(b) blocked state ( )
(c) terminated state ( )
(d) suspended state ( )

Which of the following is an example of a spooled device?

a) The secondary memory device in a virtual memory system ( )
b) A line printer used to print the output of a number of jobs ( )
c) The terminal used to enter the input data for a program being executed ( )
d) The primary memory device ( )

3. The primary distinction between the short-term scheduler and the long-term scheduler is
   (a) the length of their queues ( )
   (b) the type of processes they schedule ( )
   (c) the frequency of their execution ( )
   (d) the time of execution ( )

4. Termination of the process terminates
   (a) first thread of the process ( )
   (b) first two threads of the process ( )
   (c) all threads within the process ( )
   (d) no thread within the process ( )

5. Time quantum is defined in
   (a) shortest job scheduling algorithm ( )
   (b) round robin scheduling algorithm ( )
   (c) priority scheduling algorithm ( )
   (d) None of the above ( )

6. Memory management technique in which system stores and retrieves data from secondary storage for use in main memory is called
   (a) fragmentation ( ) *(b)* paging ( )
   (c) mapping ( ) *(d)* None of the above ( )

7. Which algorithm chooses the page that has not been used for the longest period of time whenever the page required to be replaced?
   (a) First in first out algorithm ( )
   (b) Additional reference bit algorithm ( )
   (c) Least recently used algorithm ( )
   (d) None of the above ( )

8. What is the name of the operating system that reads and reacts in terms of actual time?
   (a) Batch system ( ) *(b)* Real-time system ( )
   (c) Time-sharing system ( ) *(d)* None of the above ( )

9. Which one of the following is a visual way to determine the deadlock occurrence?

   (a) Resource allocation graph ( ) *(b)* Starvation graph ( )

   (c) Inversion graph ( ) *(d)* None of the above ( )

10. The disadvantage of a process being allocated all its resources before beginning its execution is

   (a) low CPU utilization ( )

   (b) very high-resource utilization ( )

   (c) low-resource utilization ( )

   (d) None of the above ( )

Indicate whether the following statements are *True (T)* or *False (F)* by putting a Tick (✓) mark in the brackets provided : 1×5=5

1. The systems which allow only one process execution at a time, are called uniprogramming systems.

   (T / F)

2. The time required to create a new thread in an existing process is greater than the time required to create a new process.

   (T / F)

3. Swap space exists in secondary memory.

   (T / F)

4. Time is used productively with multiprogramming.

   (T / F)

5. Trojan Horse is a useful way to encrypt password.

   (T / F)

SECTION—B

(*Marks* : 10)

Answer the following questions : 2×5=10

1. What are the advantages of distributed systems?
2. What are interrupt and context switching?
3. Define scheduling and scheduler.

4. Name any two operations performed in a file.

5. What are the differences between static and dynamic memory allocation?

(PART : B—DESCRIPTIVE)

(*Marks* : 50)

The figures in the margin indicate full marks for the questions

1. *(a)* What is an operating system? What is the need for an operating system? Discuss the major functions of an operating system with examples. 2+2+6=10

OR

(b) Describe the different types/classifications of operating systems. 6

(c) What are the major services provided by OS? 4

2. *(a)* Name the different states of a process. With a neat block diagram, explain Process Control Block (PCB). 2+4=6

(b) What are long-term and medium-term schedulers? 4

OR

(c) What is meant by message passing and shared memory model for inter-process communication? Explain. 4

(d) Consider the following set of processes :

Process Name	*Arrival Time*	*Processing Time*
P1	0	3
P2	1	5
P3	3	2
P4	9	6
P5	12	4

(i) Draw four Gantt charts that illustrate the execution of these processes using FCFS, SJF, non-preemptive priority and round robin (quantum=1) scheduling algorithms.

(ii) What is the turnaround time of each process for the above scheduling algorithms? 6

3. *(a)* What is virtual memory? Explain the concepts of swapping. 4

(b) Consider the reference string : 1, 2, 3, 4, 2, 1, 5, 6, 2, 1, 2, 3, 7, 6, 3, 2, 1, 2, 3, 6. Calculate the number of page fault occurrences using FIFO, LRU and optimal page replacement algorithms assuming three page frames. 6

OR

(c) Discuss partition allocation memory management technique with suitable diagrams. 6

(d) Write a short note on process creation. 4

4. *(a)* How are directory structures in file system organized? Briefly describe the three common directory structures used in operating systems. 2+3=5

(b) Describe the procedure of file protection using access control and authentication. 5

OR

(c) Explain the three major methods of disk space allocation in file system implementation with the help of suitable diagrams. 7

(d) What is a file attribute? Discuss the different file types. 3

5. *(a)* Describe the necessary conditions for deadlock occurrence in the system. 4

(b) Explain resource-allocation graph algorithm and banker's algorithm. 6

OR

(c) What are critical section and mutual exclusion? Explain three solutions for critical section problem. 5

(d) What are semaphores? Write a short note on properties and characteristics of semaphore. 5

★ ★ ★