BCA-301

OPERATING SYSTEM

Time Allotted: 3 Hours | Full Marks: 70

The questions are of equal value.
The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable.

GROUP A
(Multiple Choice Type Questions)

1. Answer all questions. $10 \times 1 = 10$

(i) Which one of the following process states is not a valid process state?

(A) blocked (B) load
(C) running (D) none of these

(ii) The scheduler, which selects jobs from the pool of jobs and loads them to the ready queue is

(A) long term scheduler (B) medium term scheduler
(C) short term scheduler (D) none of these

(iii) Page fault occurs when

(A) the page is corrupted by application software
(B) the page is in main memory
(C) the page is not in main memory
(D) none of these

(iv) In which of the following scheduling policies context switching will never take place

(A) round robin
(B) first cum-first served
(C) pre-emptive
(D) shortest remaining time next (SRTN)

(v) To avoid the race condition the number of processes that may be simultaneously inside their critical section is

(A) 0 (B) 1
(C) 2 (D) 4

(vi) Fork() is

(A) creation of new job (B) termination of a job
(C) increment of task priority (D) none of these

(vii) The Banker's algorithm is used

(A) to prevent deadlock in operating systems
(B) to detect deadlock in operating systems
(C) to rectify a deadlock state
(D) none of these

(viii) A process is

(A) a program (B) a job
(C) execution state of a program (D) none of these

(ix) Cipher text is

(A) normal text (B) encrypted text
(C) plain text (D) none of these

(x) CREATE is a

(A) system call (B) user's program call
(C) command (D) none of these

GROUP B
(Short Answer Type Questions)

Answer any *three* questions. 3×5 = 15

2. Explain with examples the difference between preemptive and non-preemptive priority scheduling. Distinguish between 'starvation' and 'deadlock'. 3+2

3. Explain PCB with a neat diagram. Write down the different process states. 3+2

4. Describe thrashing. Explain the demand paging in memory management scheme. 2+3

5. Suppose that the following processes arrive for execution at the time indicated: 5

Process	Arrival time	Burst time
P1	0	8
P2	1	4
P3	2	9
P4	3	5

What is the average waiting time for these processes with

(i) FCFS scheduling algorithm

(ii) SJF scheduling algorithm

(iii) RR scheduling algorithm

6. "Multi-programming implies multi-tasking, but the vice-versa is not true" – Explain. 5

GROUP C
(Long Answer Type Questions)

Answer any *three* questions. 3×15 = 45

7. (a) Explain the difference between process and program. Briefly discuss about process creation and termination. 3

(b) Consider the following set of processes. CPU Burst time of them are given below in millisecond and priority of each processes are given. 5+7

Process	CPU Burst Time	Priority	Arrival Time
P1	8	3	0.0
P2	4	1	0.4
P3	1	2	1.0

Draw the Gantt chart for priority scheduling and SRTF scheduling. Calculate the average waiting time and average turnaround time also.

8. (a) What is critical section problem? What are the requirements that the solution to critical section problem must satisfy? 10

(b) What is Semaphore? How is it accessed? Explain the Dining Philosopher's problem and give the solution of it, using Semaphore. 5

9. (a) What is swapping? What is its purpose? 3

(b) Consider the following sequence of memory references generated by a single program in a pure paging system: 4+4+4

10, 11, 104, 170, 173, 177, 309, 245, 246, 247, 458, 364.

Determine the number of page faults for each of the following page replacement policies assuming three (3) page frames are available and all are initially empty. The size of a page is 100 words:
(i) LRU
(ii) FIFO
(iii) Optimal page replacement.

10.(a) What is system deadlock? Explain necessary conditions of deadlock. 5

(b) Explain resource allocation algorithm with proper example. 5

(c) 5

Process	Allocated resources	Maximum requirement of resources
A	4	14
B	5	8
C	3	7

Available resource in the system: 15. Check whether it is in safe state or not with proper reasoning.

11. Write short notes on any *three* of the following: 3×5

(a) FIFO disk scheduling algorithm
(b) Process State Diagram
(c) Virtual memory
(d) Context switch
(e) Virtual machine