

Roll No.

BCA-401

**B. C. A. (Fourth Semester)
EXAMINATION, May, 2012**

Paper First

BASICS OF OPERATING SYSTEM

Time : Three Hours]

[Maximum Marks : 75

Note : Section A is compulsory. Attempt any *seven* questions from Section B and any *one* question from Section C.

Section – A

1. Fill in the blanks : 1 each
- (i) First-in-first-out scheduling is scheduling.
 - (ii) A scheduler which selects processes from secondary storage device is called scheduler.
 - (iii) An operating system contains 3 user processes each requiring 2 units of resources R. The minimum number of units of R such that deadlocks will never arise is
 - (iv) Round Robin scheduling is essentially the pre-emptives version of
 - (v) is the situation in which a process is waiting on another process which is waiting on the first process.

P. T. O.

- (vi) The mechanism that bring a page into memory only when it is needed is called
- (vii) Switching the C. P. U. to another process requires saving state of the old process and loading new process state is called as
- (viii) scheduling policy is most suitable for a time-shared operating system.
- (ix) is a technique of improving the priority of process waiting in queue for C. P. U. allocation.
- (x) is a technique of temporarily removing inactive programs from the memory of computer system.

2. Multiple choice questions :

1 each

- (i) The necessary conditions needed before dead-lock can occur :

- (a) No Mutual Exclusion, Hold and wait, pre-emption, circular wait.
- (b) Mutual Exclusion, No hold and wait, pre-emption, circular wait.
- (c) Mutual Exclusion, Hold and wait, pre-emption, circular wait.
- (d) Mutual Exclusion, Hold and wait, pre-emption, No circular wait.

- (ii) Copying a pocess from memory to disk to allow space for other processes is called :

- (a) Swapping
- (b) Dead-lock
- (c) Demand paging
- (d) Page fault

- (iii) A Page Fault occurs when :
- (a) The deadlock happens
 - (b) The segmentation starts
 - (c) The page is found in the memory
 - (d) The page is not found in the memory
- (iv) The memory allocation scheme to external fragmentation is :
- (a) Segmentation
 - (b) Swapping
 - (c) Pure demand paging
 - (d) Multiple fixed contiguous partitions
- (v) Which amongst the following is not a valid page replacement policy ?
- (a) LRU policy
 - (b) FIFO policy
 - (c) RU policy
 - (d) Optimal page replacement policy

3. True/False : 1 each
- (i) Ageing is the concept of multilevel queue scheduling.
 - (ii) Virtual memory is an illusion of extremely large secondary memory.
 - (iii) SPOOLING technique was introduced because a single job could not keep both the CPU and the I/O device busy.
 - (iv) The Banker's algorithm is used to detect deadlock in operating systems.

- (v) A thread is a light weight process where the context switching is high

Section – B

6 each

4. What is the cause of thrashing ? How does the system detect thrashing ? Once it detects thrashing what can the system do to eliminate this problem ?
5. List the steps needed to perform page replacement. Explain the different page replacement policies. Also list out the main requirements, which should be satisfied by a page replacement policy.
6. If the average waiting time is 30 ms for the queue of a average number of 8 processes. Calculate the average arrival rate.
7. Explain memory partitioning, paging and segmentation.
8. What are the different Dynamic Storage Allocation methods ?
9. What are the methods for handling deadlocks ?
10. What is short, long and medium term scheduling ?
11. What are different file allocation methods ? Explain in detail.
12. (i) Define CPU bound and I/O bound processes. What would be the problem if all processes were C. P. U. bound ?
(ii) Describe how the hardware support segmentation.
(iii) What is the difference between a 'thread' and a 'process' ? Explain clearly.

13. Suppose there are 2 copies of resource A, 3 copies of resources B and 3 copies of resource C. Suppose further that process 1 holds one unit of resource B and C and is waiting for a unit of A, that process 2 is holding a unit of A and waiting on a unit of B; and the process 3 is holding one unit of A, two units of B and one unit of C. Draw the resource allocation graph. Is system in a dead-lock state? Why or why not?

/ Section - C

13 each

14. (a) Consider the following page reference string : 9

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

How many page faults would occur for the following replacement algorithms, assuming four frames which all are initially free?

- (i) FIFO replacement
 - (ii) LRU replacement
 - (iii) Optimal replacement
- (b) Consider the following set of jobs with their arrival times, execution time (in minutes) : 4

Job ids	Arrival Time	Execution Time
1	0	5
2	1	15
3	3	12
4	7	25
5	10	5

Calculate the mean turn-around time and the throughput for FCFS, SJF (non-pre-emptive algorithms).

15. (a) Consider five processes P_1, P_2, P_3, P_4 and P_5 with CPU Burst times of 10, 29, 3, 7 and 12 milliseconds respectively :

- (i) Draw Gantt charts for the FCFS, SJF (pre-emptive) and RR scheduling algorithm (time quantum of 10 ms).
- (ii) Find out which of these algorithm would give the minimum average waiting time.
- (iii) Compare the average turnaround time between SJF and RR scheduling algorithm.

(b) A system contain 10 units of resource type R. The resource requirements of three user processes P_1, P_2 and P_3 are as follows :

	P_1	P_2	P_3
Maximum requirements	8	7	5
Current allocation	3	1	3
New request made	1	0	0

Using Banker's algorithm, determine if the projected allocation state is safe and whether the request of P_1 will be granted or not.