Name : ....

Roll No. : ....

Invigilator's Signature : ....

CS/BCA/SEM-3/BCA-301/2009-10

2009

OPERATING SYSTEM

Time Allotted : 3 Hours   Full Marks : 70

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.   Choose the correct alternatives for the following :

$10 \times 1 = 10$

   i)   Long-term scheduler is also known as

   a)   admission scheduler   b)   dispatch scheduler

   c)   swapping scheduler   d)   process scheduler

   e)   none of these.

   ii)   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

   e)   5.

33325   [Turn over

iii) Trashing

    a)   reduces page I/O

    b)   implies excessive page I/O

    c)   decreases the degree of multiprogramming

    d)   improve the system information

    e)   none of these.

iv) Inter-process communication

    a)   is never necessary

    b)   allows process to synchronize activity

    c)   is reguired for all process

    d)   is usually done via disk drives

    e)   none of these.

v) With a segmentation, if there are 64 segments and the maximum segment size is 512 words, the length of logical address in bits is

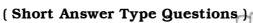   a)   12   b)   14

    c)   15   d)   16

    e)   10.

vi) The operating system is responsible for

    a)   controlling peripheral devices such as monitor, printers, disk drives

    b)   detecting errors in users' programs

    c)   provide an interface that allows users to choose programs to run and to manipulate files
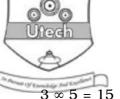
    d)   all of these.

vii) When an interrupt occurs, the operating system

    a)   ignores the interrupt

    b)   always changes state of interrupted process after processing the interrupt

    c)   always resumes execution of interrupted process after processing the interrupt

    d)   schedules another process.

viii) Context swiching is

    a)   part of spooling

    b)   part of poling

    c)   part of interrupt handling

    d)   part of interrupt servicing.

ix) Fork( ) is

    a)   creation of a new job

    b)   termination of a job

    c)   increment of task priority

    d)   none of these.

x) Producer consumer problem solved by

    a)   semaphore

    b)   event counters

    c)   monitors

    d)   all of these.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. 3 ∞ 5 = 15

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

3. Describe race condition, starvation, solution of starvation, spin lock. $1 + 1\frac{1}{2} + 1\frac{1}{2} + 1$

4. What do you mean by process ? Draw the block digram of Process Control Block. Write down the different process states. 1 + 2 + 2

5.

Process	Arrival time	Burst time
P1	0·0	8
P2	0·4	4
P3	1·0	1

a) What is the average turnaround time for these processes with the FCFS scheduling algorithm ?

b) What is the average turnarono time for these processes with the SJF scheduling algorithm ? 5

6. Differentiate any *two* of the following : 5

a) Logical *vs* physical address space

b) Process *vs* threads

c) Single partition allocation *vs* multiple partition allocation.

GROUP – C
(Long Answer Type Questions)

Answer any *three* of the following. 3 ∞ 15 = 45

7. a) What are the objectives of three levels of scheduling ? Define contiguous, linked and indexed disk blocks allocation methods.

b) Assume that you have the following jobs to execute with one processor.

Job	Burst Time	Priority
1	15	3
2	2	1
3	4	3
4	2	4
5	8	2

i) Draw the "Gantt chart" illustration the execution of these jobs using FCFS, Round Robin
(time quatum = 2).

ii) Find average turn around time and average waiting time for the above RR scheduling algorithm.

4 + 3 + (4 + 4)

8. Describe a system model for deadlock. Explain the combined approach to deadlock handling. Explain Banker's algorithm for deadlock avoidance. Differentiate process switching and context switching. 3 + 5 + 4 + 3

9. What is semaphore ? How can semaphore be used to enforce mutual exclusion ? Explain Readers and Writers problem. Explain Dining philosopher problem. 4 + 3 + 4 + 4

10. a) Consider the following page reference string :

   0100, 0432, 0101, 0612, 0102, 0103, 0104, 0101, 0611, 0102, 0103, 0104, 0101, 0610, 0102, 0103, 0104, 0101, 0609, 0102, 0105.

   Calculate the page fault rate for the following algorithm :

   • FIFO

   • LRU

   • Optimal

   [Memory size is 3 frames]

   b) What do you mean by "Virtual memory" ? 12 + 3

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

    a)   Process Control Block

    b)   Scheduler

    c)   Paging

    d)   Segmentation

    e)   Optimal page replacement algorithm.

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CS/BCA/SEM-3/BCA-301/2010-11

2010-11

OPERATING SYSTEM

Time Allotted : 3 Hours   Full Marks : 70

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. Choose the correct alternatives for the following : 10 × 1 = 10

    i)   What is a shell ?

        a)   It is a hardware component

        b)   It is a command interpreter

        c)   It is a part of compiler

        d)   It is a tool in CPU scheduling.

    ii)   Virtual memory is

        a)   an extremely large main memory

        b)   an extremely large secondary memory

        c)   an illusion of extremely large storage provision

        d)   a type of memory used in super computers.

3066   [Turn over

iii) Multiprogramming systems

    a)   are easier to develop than single programming systems

    b)   execute each job faster

    c)   execute more jobs in the same time

    d)   are used only on large main frame computers.

iv) Which is not the state of the process ?

    a)   Blocked   b)   Running

    c)   Ready   d)   Privileged.

v) The number of processes completed per unit time is known as

    a)   Output

    b)   Throughput

    c)   Efficiency

    d)   Capacity.

vi) A critical region

    a) is a piece of code which executes only one process at a time

    b) is a region prone to deadlock

    c) is a piece of code which executes only a finite number of process

    d) is found only in Windows NT operation system.

vii) The mechanism that bring a page into memory only when it is needed is called

    a) Segmentation

    b) Fragmentation

    c) Demand Paging

    d) Page Replacement.

viii) PCB stands for

    a) Program Control Block

    b) Process Control Block

    c) Process Communication Block

    d) None of these.

ix) The Banker's algorithm is used

a) to prevent deadlock in operating systems

b) to detect deadlock in operating systems

c) to rectify a deadlocked state

d) none of these.

x) FIFO scheduling is

a) Preemptive scheduling

b) Non-preemptive scheduling

c) Deadline scheduling

d) Fair share scheduling.

GROUP – B
(Short Answer Type Questions)

Answer any *three* of the following.   3 × 5 = 15

2. Explain PCB with a neat diagram.

3. Explain multilevel feedback queue.

4. Explain the difference between process and program.

5. What do you mean by critical regions ?

6. What is the difference between a long-term schedulers and a short-term scheduler ?

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. $3 \times 15 = 45$

7. a) Define a process. Describe the life cycle of a process.

    b) What do you mean by synchronization with respect to Inter Process Communication ?

    c) Define context switch. $(2 + 4) + 5 + 4$

8. a) What do you understand by race condition ? Give few examples of arising of race condition in concurrent processing.

    b) Suppose that the following processes arrive for execution at the time indicated :

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.

    c) What is the importance of an interrupt in scheduling ?

    $(3 + 2) + 6 + 4$

9. a) Consider the following snapshot of a system :

	Allocation	Max	Available
	A B C D	A B C D	A B C D
P_0	0 0 1 2	0 0 1 2	1 5 2 0
P_1	1 0 0 0	1 7 5 0	
P_2	1 3 5 4	2 3 5 6	
P_3	0 6 3 2	0 6 5 2	
P_4	0 0 1 4	0 6 5 6	

Answer the following questions using the banker's algorithm.

i) What is the content of the matrix need ?

ii) Is the system in a safe state ?

iii) If a request from process P_1 arrives for (4, 2, 0) can the request be granted immediately ?

b) Write the difference between partition allocation and multiple partition allocation.

c) Under what conditions do page faults occur ? 10 + 3 + 2

10. a) What is critical section problem ? Explain with a suitable example.

b) What is semaphore ? Write down the algorithm, using semaphore to solve producer-consumer (Finite lubber) problem.

c) Write down the problem with disable interrupts.

11. Write short notes on any *three* of the following :   3 × 5 = 15

 i) Virtual Machine

 ii) Monitor

 iii) Thrashing

 iv) Distributed OS

 v) RAID.

2011
OPERATING SYSTEM

Time Allotted : 3 Hours

Full Marks : 70

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. Choose the correct alternatives for the following :

$10 \times 1 = 10$

i) The technique of temporarily removing inactive programs from the memory of a computer system is

   a) switching   b) swapping

   c) paging   d) none of these.

ii) The time required for read-write head to travel to target cylinder is called

   a) latency time   b) seek time

   c) transfer time   d) none of these.

iii) The technique of relocating all occupied areas of storage to one end is called

   a) sharing   b) relocation

   c) compaction   d) distribution.

3077

[Turn over

iv) Which of the following statements is false ?

    a) Implicit task is a system-defined task

    b) A process is an instance of a program execution

    c) Buffering is a sophisticated form of spooling

    d) Time-sharing system follows Round-robin algorithm.

v) The coincidence of high page traffic and low CPU utilization is

    a) Belady's Anomaly   b) Mutual Exclusion

    c) Deadlock   d) Thrashing.

vi) Which scheduling algorithm is inherently preemptive ?

    a) FCFS   b) SJF

    c) RR   d) Priority scheduling.

vii) The optimal scheduling algorithm is

    a) FCFS   b) SJF

    c) RR   d) None of these.

viii) Thrashing

    a) reduces page I/O

    b) decreases the degree of multiprogramming

    c) implies excessive page I/O

    d) improves the system performance.

ix) Fork is

    a) the creation of a new job

    b) the dispatching of a task

    c) increasing the priority of a task

    d) the creation of new task.

x) RMI stands for

    a) Remote Method Interface

    b) Remote Message Interface

    c) Remote Method Invocation

    d) None of these.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. $3 \times 5 = 15$

2. Consider the following resource allocation state involving processes P0, P1, P2, P3 and P4 and resources R0, R1, R2, R3 and R4 :

Resources Assigned					Resources Still Needed				
Processes	Resources				Processes	Resources			
	R1	R2	R3	R4		R1	R2	R3	R4
A	3	0	1	1	A	1	1	0	0
B	0	1	0	0	B	0	1	1	2
C	1	1	1	0	C	3	1	0	0
D	1	1	0	1	D	0	0	1	0
E	0	0	0	0	E	2	1	1	0

Available resources = 1   0   2   0

Determine whether the system is in a safe state or not.

3. Explain with examples the difference between preemptive and non-preemptive priority scheduling.

4. Distinguish between 'starvation' and 'deadlock'.

5. Explain PCB with a neat diagram.

6. What is thread ? Compare it with process. $2 + 3$

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. $3 \times 15 = 45$

7. a) Explain the following file access methods : 3×3

   i) Direct

   ii) Sequential

   iii) Indexed Sequential.

   b) What is Memory Compaction ? What is its use ? $3 + 3$

8. a) What is swapping ? What is its purpose ?

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

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.   3 + 4 + 4 + 4

9. a) Describe a system model for deadlock.

b) Explain the combined approach to deadlock handling.

c) Differentiate process switching and context switching.

              5 + 5 + 5

10. a) Explain Mutual exclusion.

b) Write the first algorithm of mutual exclusion algorithm.

c) What are its problems ?

              5 + 7 + 3

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

a) Round Robin Scheduling

b) Thrashing

c) Virtual memory

d) Paging and Segmentation.

———————

CS/BCA/SEM-3/BCA-301/2012-13

2012

OPERATING SYSTEMS

Time Allotted : 3 Hours   *Full Marks* : 70

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.   Choose the correct alternatives for the following :

$10 \times 1 = 10$

   i)   Multiprogramming is

      a)   single program executing on a machine

      b)   more than one program executing on a machine

      c)   single program executing on more than one machines

      d)   more than one program executing on multiple machines.

3077   [Turn over

ii) In the memory hierarchy of operating system, ... is the fastest accessible memory.

a) CPU register   b) Disk

c) Main memory   d) Cache memory.

iii) In .... mode, machine is executing operating system instructions.

a) User   b) System

c) Safe   d) Normal.

iv) The surface of floppy disk is made of concentric circles called

a) Sectors   b) Records

c) Blocks   d) Tracks.

v) The aim of I/O scheduling is

a) reducing seek time

b) reducing processing time

c) reducing read time

d) none of these.

vi) SSTF stands for

    a)   shortest seek time factor

    b)   shortest seek time first

    c)   shortest storage time factor

    d)   none of these.

vii) ……………… is used by the operating system to store information about a process.

    a)   DCB

    b)   Disk memory

    c)   PCB

    d)   TCB.

viii) The time elapsed between the job submission and its completion is

    a)   Response time

    b)   Waiting time

    c)   Terminal response time

    d)   Turnaround time.

ix) When the memory wastage is within the partition itself, it is called

    a) Compaction

    b) External fragmentation

    c) Internal fragmentation

    d) Worst fit.

x) Address generated in segmentation is …………… dimensional.

    a) one   b) two

    c) three   d) five.

GROUP – B
(Short Answer Type Questions)
Answer any *three* of the following. $3 \times 5 = 15$

2. What do you mean by critical section ?

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

4. Explain multilevel queue scheduling.

5. What is virtual memory ?

6. What is fragmentation ? Describe briefly.

GROUP – C
(Long Answer Type Questions)
Answer any *three* of the following. 3 × 15 = 45

7. a) What is process ? Explain Process State and Process Control Block.

   b) Suppose that the following processes arrive for execute at the time indicated :

Process	Arrival Time	Burst Time	Priority
P0	0	5	2
P1	2	7	4
P2	3	9	1
P3	3	4	5
P4	4	3	3

   Draw the Gantt chart and calculate the average waiting for

   i) FCFS scheduling algorithm

   ii) Priority scheduling algorithm

   iii) Preemptive SJF scheduling algorithm

   iv) RR scheduling algorithm. 1 + (3 + 3) + 8

8. What are the conditions for deadlock ? Describe a system model for deadlock. Explain Resource allocation graph algorithm for deadlock avoidance. Discuss deadlock recovery technique. 4 + 3 + 4 + 4

9. What is semaphore ? How can semaphore be used to enfore mutual exclusion ? Explain Producer-Consumer problem. Explain Dining Philosopher problem. 4 + 3 + 4 + 4

10. a) Consider the following resource allocation state involving processes P0, P1, P2, P3, P4 and P5 and resources R0, R1, R2 and R3 :

Process	Allocation				Max				Available			
	R0	R1	R2	R3	R0	R1	R2	R3	RO	R1	R2	R3
P0	1	0	0	2	2	3	5	3	1	2	3	3
P1	0	0	2	0	2	1	3	5				
P2	1	0	3	0	1	2	3	2				
P3	1	2	3	4	2	3	3	6				
P4	1	0	0	3	2	4	5	6				
P5	0	1	3	2	3	5	7	8				

Answer the following questions using banker's algorithm.

    i) What is the content of matrix need ?

    ii) Is the system in a safe state ?

    iii) If a request from process P1 arrives for (5, 2, 7 9) can the request be granted immediately ?

b) Differentiate process switching and context switching.

c) Under which condition does page fault occur ?

10 + 3 + 2

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

    a) Scheduler

    b) Remote procedure call

    c) Monitor

    d) Distributed OS

    e) Virus and Worms

    f) File access methods.

———————

CS/BCA/SEM-3/BCA-301/2013-14

2013

OPERATING SYSTEMS

Time Allotted : 3 Hours   *Full Marks : 70*

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. Choose the correct alternatives for the following : $10 \times 1 = 10$

    i) A process has finished its execution when it is in .... state.

       a) running   b) blocked

       c) ready   d) terminated.

    ii) The technique of temporarily removing inactive programs from the memory of a computer system is

       a) Switching   b) Swapping

       c) Paging   d) None of these.

    iii) The time required for read-write head to target cylinder is called

       a) Latency time   b) Seek time

       c) Transfer time   d) None of these.

    iv) The technique of relocating all occupied areas of storage to one end is called

       a) Sharing   b) Relocation

       c) Compaction   d) Distribution.

v) The application of linked list results in

    a) Contiguous allocation of memory

    b) Non-contiguous allocation of memory

    c) Internal fragmentation of memory

    d) External fragmentation of memory.

vi) Which of the following statements if *false* ?

    a) Implicit task is a system-defined task

    b) A process is an instance of a program execution

    c) Buffering is a sophisticated form of Spooling

    d) Time-sharing system follows Round-robin algorithm.

vii) Short replicating programs that uses time of the CPU unnecessarily is a

    a) Worm   b) Virus

    c) Distributed Process   d) Trojan Horse.

viii) The coincidence of high page traffic and low CPU utilization is

    a) Belady's anomaly   b) Mutual exclusion

    c) Deadlock   d) Thrashing.

ix) The data structure that maps each page frame with the physical memory is

    a) Page-map table   b) Memory-map table

    c) Stack   d) Queue.

x) The technique of dividing the address space of a process to place them into non-contiguous areas of memory is called

    a) Paging

    b) Segmentation

    c) Translation through TLB

    d) Defragmentation.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following.   3 × 5 = 15

2.   a)   When does a page-fault occur ?   2

     b)   Describe the action taken by the operating system when a page fault occurs.   3

3.   Explain PCB with a neat diagram.

4.   Explain with examples the difference between preemptive and non-preemptive priority scheduling.

5.   Explain the demand paging in memory management scheme.

6.   Distinguish between 'starvation' and 'deadlock'.

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following.   3 × 15 = 45

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

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

Process	CPU Burst Time	Priority
P1	10	3
P2	1	1
P3	2	2
P4	1	5

Draw the Gantt chart for priority scheduling. Calculate the average waiting time also.   3 + 7 + 5

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

   b) What is Semaphore ? How is it accessed ? Explain the Dining Philosopher's problem and give the solution of it. using monitor. 5 + 10

9. a) What is deadlock ? Write down necessary conditions for deadlock ?

   b) Determine whether the processes are in safe state or unsafe state :

Process	Resources Allocated	Max. requirement of resources	Max. resources Requested
A	4	14	10
B	5	8	3
C	3	7	4

   Total No. of available resources in the system is 15.

   5 + 10

10. a) Explain Mutual exclusion.

    b) Write the first algorithm of mutual exclusion algorithm.

    c) What are its problems ? 5 + 5 + 5

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

    a) Priority scheduling

    b) Thrashing

    c) Virtual memory

    d) Paging and Segmentation.

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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.   10×1 = 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)

3025   1   [Turn over]

(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

MAULANA ABUL KALAM AZAD UNIVERSITY OF TECHNOLOGY, WEST BENGAL

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.
All symbols are of usual significance.

GROUP A
(Multiple Choice Type Questions)

1. Answer *all* questions.

    $10 \times 1 = 10$

    (i) In the memory hierarchy, _____ is the slowest accessible memory

    (A) main memory   (B) secondary memory

    (C) cache memory   (D) CPU registers

    (ii) A process control block of a process contains

    (A) process state   (B) CPU-scheduling information

    (C) accounting information   (D) all of these

    (iii) Threads of a process do not share

    (A) memory space   (B) execution stack

    (C) file descriptor   (D) none of these

(iv) Dispatcher of an operating system

(A) invokes a pager during page fault

(B) is a scheduler

(C) gives control of CPU to the process selected by short-term scheduler

(D) gives control of CPU to the process selected by long-term scheduler

(v) SJF stands for

(A) Shortest Job Frequency   (B) Shortest Job Factoring

(C) Shortest Job First   (D) None of these

(vi) SSTF stands for

(A) Shortest Seek Time First   (B) Shortest Search Time First

(C) Shortest Seek Timing First   (D) Shortest Sleek Time First

(vii) Information of a process is stored as

(A) linked list   (B) queue

(C) process control block   (D) none of these

(viii) Semaphore can be implemented as

(A) stack   (B) tree

(C) queue   (D) hash table

(ix) Necessary conditions for deadlock are

(A) mutual exclusion   (B) no preemption

(C) hold and wait   (D) all of these

(x) In paging, logical address is mapped to

(A) page number and page offset   (B) frame number and frame offset

(C) page number and offset   (D) frame number and page offset

GROUP B
(Short Answer Type Questions)

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

2. Explain State Transition Diagram of a Process. 5

3. What are the necessary and sufficient conditions for deadlock to occur? What is thrashing? 4+1

4. What do you mean by Race Condition with respect to Producer – Consumer Problem? Explain how Race Condition can be avoided. 3+2

5. A computer provides each process with 65536 bytes of address space divided into 4096 bytes. A particular program has text size of 32768 bytes, data size of 16386 bytes and stack size of 15870 bytes. Will this program fit in the address space? If the page size were of 512 bytes, would it fit? Give reasons for all your answers. 3+2

6. Different memory partitions of 150 K, 820 K, 360 K and 350 K (in the given order) are present. Explain how best fit algorithm can be used to place a process of 315 K. What are the advantages and disadvantages of using best fit over worst fit and first fit algorithms? 2+3

GROUP C
(Long Answer Type Questions)

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

7. (a) Describe producers and consumers problem with an unbounded buffer with a sample program. 8

   (b) What is Process Migration? Write down the steps followed during process migration. 3+4=7

8. (a) Write and explain the logic of the "Bully algorithm for election of a successor" in a distributed system. 7

(b) Briefly describe about the common failures in distributed systems. 6

(c) What are the necessary conditions for deadlock? 2

9. Consider the following page reference sequence: 15
   7 0 1 2 0 3 0 4 2 3 0 3 2 1 2 0 1 7 0 1
   - Assume that the main memory is initially empty
   - The number of page frames is 3
   Calculate the Hit Ratios by the following algorithms:
   (i) FIFO
   (ii) LRU
   (iii) Optimal

10. (a) Suppose that a disk drive has 5000 cylinders, numbered from 0 to 4999. The 12
    drive is currently serving a request at cylinder 143 and the previous request
    was at cylinder 125. The queue of pending requests, in FIFO order is:
        86, 1470, 913, 1774, 948, 1509, 1022, 1750, 130
    Starting from the current head position, what will be the total distance the
    disk arm moves following the disk scheduling algorithms:
    (i) FCFS
    (ii) SSTF
    (iii) SCAN
    (iv) LOOK
    (v) C-SCAN
    (vi) C-LOOK

   (b) What is Spooling? 3

11. Write short notes on any *three* of the following: 3×5
    (a) The Take-Grant Model
    (b) Multiprocessor scheduling
    (c) Artifact-based Authentication
    (d) DES
    (e) Digital Signature.

CS/BCA/ODD SEM/SEM-3/BCA-301/2016-17

MAULANA ABUL KALAM AZAD UNIVERSITY OF TECHNOLOGY, WEST BENGAL

Paper Code : BCA-301

OPERATING SYSTEM

Time Allotted : 3 Hours   *Full Marks* : 70

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. Choose the correct alternatives for the following :

                                             $10 \times 1 = 10$

i)   Fork( ) is

    a)   Creation of a new process

    b)   Dispatching of a task

    c)   Increment of task priority

    d)   None of these.

ii) A null process has a process identifier

    a)   – 1   b)   0

    c)   1   d)   Null.

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iii) Computer Virus is

    a) a software

    b) a code attached to software

    c) intruders

    d) none of these.

iv) Which is not a layer of operating system ?

    a) Kernel

    b) Shell

    c) Application program

    d) Critical section.

v) TLB stands for

    a) Transition Look-Aside Buffer

    b) Translation Look-Aside Buffer

    c) Translation Local Buffer

    d) Translating Look-Aside Buffer.

vi) Thrashing

    a) reduces page I/O

    b) improves the system information

    c) implies excessive page I/O

    d) decreases the degree of multiprogramming.

vii) Context Switching is

    a) Part of Spooling

    b) Part of Poling

    c) Part of Interrupt Handling

    d) Part of Interrupt Servicing.

viii) The number of processes completed per unit time is known as

    a) output   b) capacity

    c) efficiency   d) throughput.

ix) In priority scheduling algorithm

    a) CPU is allocated to the process with highest priority

    b) CPU is allocated to the process with lowest priority

    c) equal priority processes cannot be scheduled

    d) none of these.

x) Round Robin scheduling falls under the category of

    a) non pre-emptive scheduling

    b) pre-emptive scheduling

    c) both (a) and (b)

    d) none of these.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following.   3 × 5 = 15

2. Explain PCB.

3. Define thread and its life cycle.

4. What do you mean by Critical Section Problem ? Explain with example.

5. Explain Demand Paging in memory management scheme. What is Multilevel Feedback Queue ?

6. What is page fault ? When does it occur ?

CS/BCA/ODD SEM/SEM-3/BCA-301/2016-17

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following.   3 × 15 = 45

7. a) Name some criteria to evaluate a processor management scheme.

    b) What do you mean by long term, short term, and medium term scheduler ?

    c) What is multilevel feedback queue scheduling ?

    5 + 5 + 5

8. a) What do you mean by race condition ?

    b) Explain in detail the operations of semaphore.

    c) Explain the classical problems of synchronization in detail.   5 + 5 + 5

9. What are the necessary conditions for deadlock ? Describe a system model for deadlock. Explain the resource allocation graph for deadlock avoidance. Discuss different deadlock recovery techniques.

    2 + 5 + 5 + 3

10. a) Consider the following page reference string :

    0 1 3 6 2 4 5 2 5 0 3 1 2 5 4 1 0

    Calculate the page fault rate for the following algorithm :

    i) FIFO

    ii) LRU

    iii) Optimal (Memory size is 3 Frames).

    b) Explain Belady's anomaly for page replacement algorithm.   4 + 4 + 4 + 3

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

    a) Distributed OS

    b) Thrashing

    c) File access methods

    d) Virtual memory

    e) Segmentation.

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Time Allotted : 3 Hours   *Full Marks* : 70

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GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for any *ten* of the following :   10 × 1 = 10

    i) Virtual memory is

        a) an extremely large main memory

        b) an extremely large secondary memory

        c) an illusion of extremely large storage provision

        d) a type of memory used in super computers.

ii) The time required for read-write head to travel to target cylinder called

    a)   latency time   b)   seek time

    c)   transfer time   d)   none of these.

iii) The number of processes completed per unit time is known as

    a)   output   b)   throughput

    c)   efficiency   d)   capacity.

iv) Context swiching is

    a)   part of spooling

    b)   part of poling

    c)   part of interrupt handing

    d)   part of interrupt servicing.

v) Which of the following is also known as multilevel adaptive scheduling ?

    a)   Multilevel queue scheduling

    b)   Multilevel scheduling

    c)   Multilevel feedback queue scheduling

    d)   None of these.

vi) Which of the following requirements must be met by a solution to critical-section problem ?

    a) Bounded waiting   b) Progress

    c) Mutual exclusion   d) All of these.

vii) Which of the following algorithms suffers from Belady's anomaly ?

    a) Optimal page replacement

    b) LRU page replacement

    c) FIFO page replacement

    d) None of these.

viii) FIFO scheduling is

    a) Preemptive scheduling

    b) Non-preemptive scheduling

    c) Deadline scheduling

    d) Fair share scheduling.

ix) The time elapsed between the job submission and its completion is

    a) Response time

    b) Waiting time

    c) Turnaround time

    d) Terminal response time.

x) Dispatcher of an OS

    a) invokes a pager during page fault

    b) is a scheduler

    c) gives control of CPU to the process selected by long term scheduler

    d) gives control of CPU to the process selected by short term scheduler.

xi) Which of the following is used for implementing control synchronization ?

    a) Semaphore   b) Precedence Graph .

    c) Monitors   d) Peterson's algorithm.

GROUP - B

(Short Answer Type Questions)

Answer any *three* of the following.   3 × 5 = 15

2. a) What is an Operating System ? What are the functions of Operating System ?

    b) Explain "multitasking is logical extension of multiprogramming".   3 + 2

3. Describe shared resource system and message passing system. $2\frac{1}{2} + 2\frac{1}{2}$

4. a) Discuss Belady's anomaly.

   b) What is "thrashing" ? 4 + 1

5. Differentiate between external fragmentation and internal fragmentation.

6. What is race condition ? Explain Peterson solution for avoiding race condition.

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. 3 × 15 = 45

7. Suppose that the following processes arrive for execute at the time indicated :

Process	Arrival Time	Duration
P1	0	6
P2	2	4
P3	3	7
P4	5	2

Draw Gantt chart and determine average waiting time using

(i) FCFS, (ii) RR, (iii) SJF (preemptive) algorithm. 5 + 5 + 5

8. a) Consider the following resource allocation state involving processes P0, P1, P2, P3, P4 and P5 and resources R0, R1, R2 and R3 :

Process	Allocation				Max				Available			
	R0	R1	R2	R3	R0	R1	R2	R3	R0	R1	R2	R3
P0	1	0	0	2	2	3	5	3	1	2	3	3
P1	0	0	2	0	2	1	3	5				
P2	1	0	3	0	1	2	3	2				
P3	1	2	3	4	2	3	3	6				
P4	1	0	0	3	2	4	5	6				
P5	0	1	3	2	3	5	7	8				

Answer the following questions using banker's algorithm.

   i)   What is the content of matrix need ?

   ii) Is the system in a safe state ?

   iii) If a request from process P1 arrives for (5, 2, 7, 9) can the request be granted immediately ?

   b) Differentiate between process switching and context switching.

   c) Under which condition does page fault occur ?

10 + 3 + 2

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

   b) What is semaphore ? How is it accessed ? Explain the Dining philosopher's problem and give the solution of it using monitor. 5 + 10

10. 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 using FIFO, Optimal, LRU and LFU replacement algorithm ? Assume four frames. 3 + 4 + 4 + 4

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

   a) Multi-Queue Scheduling

   b) Resource Allocation Graph (RAG)

   c) Round Robin Scheduling Method

   d) Readers-Writers Problem

   e) Virus and Worm.

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Paper Code : BCA-301

OPERATING SYSTEMS

Time Allotted: 3 Hours   *Full Marks*: 70

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Candidates are required to give their answers in their own words
as far as practicable.

Group – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for each of the following: 1×10=10

    (i) Locality of references justifies the use of

    (a) Interrupts   (b) Polling

    (c) DMA   (d) Cache memory

    (ii) Which scheduling policy is most suitable for time shared operating system?

    (a) SJF   (b) RR

    (c) FCFS   (d) Elevator

    (iii) Thrashing

    (a) reduces page I/O.   (b) decreases the degree of multi programming

    (c) implies excessive page I/O.   (d) improve system performance.

    (iv) Increase of RAM in a computer typically improves performance because

    (a) virtual memory increases.   (b) larger RAMs are faster.

    (c) fewer page faults occur.   (d) fewer segmentation fault.

    (v) Dirty bit indicates

    (a) helps avoid unnecessary write on a paging device.

    (b) helps maintain LRU information.

    (c) allows only read on a page.

    (d) None of the above

8490   **Turn Over**

(vi) A set of resources allocations such that the system can allocate resources to each process in some order and still avoid a deadlock is called

 (a) Unsafe State   (b) Safe State

 (c) Starvation   (d) Greedy Allocation

(vii) The main function of the dispatcher is

 (a) Swapping a process to the disk.

 (b) Assigning ready process to the CPU.

 (c) Suspending some of the processes when the CPU load is high.

 (d) Bring processes from the disk to the main memory.

(viii) The total time to prepare a disk drive mechanism for a block of data to be read from it is

 (a) Seek time   (b) Latency time

 (c) Seek time and Latency time   (d) Transmission time

(ix) Which of the following disk scheduling strategies is likely to give the best throughput?

 (a) Farthest cylinder next   (b) Nearest cylinder next

 (c) First come first serve   (d) Elevator algorithm

(x) Context switching is

 (a) part of spooling   (b) part of polling

 (c) part of interrupt handling   (d) part of interrupt servicing

Group – B
(Short Answer Type Questions)
Answer *any three* of the following.   5×3=15

2. Define Thread and compare fork() and clone().   2+3=5

3. What is Belady's Anomaly? Explain with an example.

4. Compare CSCAN and CLOOK disk arm scheduling algorithms with examples.

5. Explain with examples the difference between preemptive and non-preemptive priority scheduling.

6. Distinguish between starvation and deadlock.

Group – C

(Long Answer Type Questions)

Answer *any three* of the following.   15×3=45

7.   (a) Discuss different data structure implementations of Page Table.

      (b) Discuss paging with segmentation scheme of memory management.

      (c) Discuss Bounded Buffer Producer Consumer problem with pseudo code.   6+3+6=15

8.   (a) Explain Peterson's 3rd algorithms with pseudo code. Discuss the merits and demerits of this algorithm.

      (b) Discuss writer biased "Readers-Writers" problem with pseudo code with the help of semaphores.

      (c) The address sequence generated by tracing a particular program executing in a pure demand paging system with 100 bytes per page is

           0100, 0200, 0430, 0499, 0510, 0530, 0560, 0120, 0220, 0240, 0260, 0320, 0410.

      Suppose that the memory can store only one page at a time and if X is the address which causes a page fault then from addresses X to X+99 are loaded on to the memory. How many page faults will occur?   6+3+6=15

9.   (a) Differentiate between internal and external fragmentation. Compare Best fit and Worst fit searching strategy.

      (b) Explain manual recovery mechanism of deadlock in details.

      (c) What is demand paging?   6+6+3=15

10.   (a) Consider the following snapshot of a system:

	Allocation				Max				Available			
	A	B	C	D	A	B	C	D	A	B	C	D
P0	0	0	1	2	0	0	1	2	1	5	2	0
P1	1	0	0	0	1	7	5	0				
P2	1	3	5	4	2	3	5	6				
P3	0	6	3	2	0	6	5	2				
P4	0	0	1	4	0	6	5	6				

      Examine the system is in safe state or not.

      (b) What is memory compaction? What is its use?

      (c) Explain PCB with a neat diagram.   5+(3+3)+4=15

11. (a) Calculate and compare the average cylinder movements for the SSTF algorithm:

27, 129, 110, 186, 147, 41, 10, 64, 120

(Suppose the disk drive has 200 cylinders numbered 0 to 199. The drive is currently serving a request at cylinder 143.)

(b) Consider the following set of process; calculate the average waiting time for the preemptive SRTF scheduling algorithm. Show the Gnatt chart also.

Process	Arrival time	Process time
A	0	3
B	1	5
C	3	2
D	9	5
E	12	5

(c) Explain the following file access methods with example:

(i) Direct

(ii) Sequential

(iii) Indexed sequential   4+5+6=15

_____

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