HALDIA INSTITUTE OF TECHNOLOGY

(AN AUTONOMOUS INSTITUTION UNDER MAULANA ABUL KALAM AZAD UNIVERSITY OF TECHNOLOGY, WEST BENGAL)

Paper Code: PCC-CS 502

Paper Name: Operating Systems

Time Allotted: 1 Hours 30 Minutes *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 from the followings: 30 x 1 = 30

(i) Find the odd: [CO2]
a)CPU Utilization b)Throughput c)Turn-Around Time d)Long-Term Scheduling

(ii) The process of bringing a process to memory and after running for a while, temporarily copying to disk is known as ____ [CO5]
a)Address Binding b)Compilation c)Overlaying d)Swapping

(iii) Which of the following is not shared by the threads of the same process? [CO2]
a)Stack b)File Descriptor Table c)Address Space d)Message Queue

(iv) Which of the following reduces degree of multiprogramming [CO1]
a)Long-term Scheduler b)Short-term Scheduler c)Middle-term Scheduler d)All

(v) General approaches to handling deadlock do not include____ [CO4]
a)Prevention b)Deterrence c)Detection d)Avoidance

(vi) Find the odd: [CO5]
a)Best Fit b)Most Fit c)First Fit d)Worst Fit

(vii) CPU generates ____ [CO5]
a)Logical Address b)Physical Address c)Relative Address d)All of the above.

(viii) Which scheduling policy is most suitable for a time shared operating system? [CO2]
a)SJF b)SRTF c)Round Robin d)FCFS

(ix) Which of the following does not interrupt a running process? [CO2]
a)A device b)Scheduler Process c)Timer d)Power Failure

(x) When the result of a computation depends on the speed of the processes involved, there is said to be [CO2]
a)cycle stealing b) race condition c) a time lock d) a deadlock

(xi) What is the minimum number of memory accesses needed in paging? [CO5]

a) 2 b) 3 c) 4 d) 5

(xii) TLB is implemented using [CO5]

a) Associated memory b) Cache memory c) Main memory d) None of these

(xiii) Increasing the RAM of a computer typically improves the performance because: [CO5]

a) Virtual memory increases b) Larger RAMs are faster

c) Fewer page faults occur d) Fewer segmentation faults occur

(xiv) In order to allow only one process to enter its critical section, binary semaphore are initialized to: [CO2]
a) 0 b)1 c)2 d)3

(xv) If a process is executing in its critical section, then no other processes can be executing in their critical section. This condition is called [CO3]
a) mutual exclusion b) critical exclusion c) synchronous exclusion d) asynchronous exclusion

(xvi) Bootstrap loader resides in [CO1]
a)RAM b)ROM c)Cache d)Hard disk

(xvii) Solution of external fragmentation is [CO5]
a)Defragmentation b) Bare machine c)Compaction d)Multiprogramming

(xviii) Banker's algorithm for [CO4]
a)Deadlock recovery b) Deadlock prevention c)Deadlock avoidance d)All of the above

(xix) Time spent by a process in ready queue is [CO2]
a)waiting time b)Turn around time c)Response time d) throughput

(xx) Fork() is [CO2]
a)creation of new process b)deletion of a process
c)Dispatching of a process d) All of the above

(xxi) FAT means [CO6]
a)File allocation Tool b) File allocation Task c) File allocation Table d)None of the above

(xxii) Which of the following memory management strategy combines the features of paging system with swapping? [CO5]
a)Segmentation b)Demand paging c)Compaction d)Multiprogramming

(xxiii) .Consider a logical address space of 8 pages of 1024 words, each mapped onto a physical memory of 32 frames then how many bits are in physical address? [CO5]
a)10 b)13 c)15 d)18

(xxiv) On a demand pages system, it takes 120 ns to satisfy a memory request if the page is in memory. If the page is not in memory, a request takes on an average 50 micro second. What is the average memory access time if the page fault rate is 20%. [CO5]
a)18.765 microsecond b)10.096 microsecond c)13.02 microsecond d)8.987 microsecond

(xxv) A thread is usually defined as a "light weight process" because an operating system (OS) maintains smaller data structures for a thread than for a process. In relation to this, which of the following is TRUE? [CO2]
a) On per-thread basis, the OS maintains only CPU register state
b) The OS does not maintain a separate stack for each thread
c) On per-thread basis, the OS does not maintain virtual memory state
d) On per-thread basis, the OS maintains only scheduling and accounting information

(xxvi) Which one of the following is FALSE? [CO2]
a) User level threads are not scheduled by the kernel.
b) When a user level thread is blocked, all other threads of its process are blocked.
c) Context switching between user level threads is faster than context switching between kernel level threads.
d) Kernel level threads cannot share the code segment

(xxvii) A solution to the Dining Philosophers Problem which avoids deadlock is: [CO3]
a) ensure that all philosophers pick up the left fork before the right fork
b) ensure that all philosophers pick up the right fork before the left fork
c) ensure that one particular philosopher picks up the left fork before the right fork, and that all other philosophers pick up the right fork before the left fork
d) None of the above

(xxviii) The essential content(s) in each entry of a page table is / are [CO5]
a)Virtual page number b)Page frame number
c)Both virtual page number and page frame number d)Access right information

(xxix) The optimal page replacement algorithm will select the page that [CO5]
a)Has not been used for the longest time in the past
b)Will not be used for the longest time in the future
c)Has been used least number of times
d)Has been used most number of times

(xxx) Locality of reference implies that the page reference being made by a process [CO5]
a) will always be to the page used in the previous page reference
b) is likely to be to one of the pages used in the last few page references
c) will always be to one of the pages existing in memory
d) will always lead to a page fault

Group – B
(Multiple Choice Type Questions)

2. Choose the correct alternatives from the followings: 20 x 2 = 40

(i) Four jobs arrived at time 0+ in the order A,B,C,D on a single processor system. Their Burst time requirements are 4,1,8,2 time units respectively. The completion time of A under Round Robin Scheduling with time slice of one time unit is [CO2]
a)10 b)8 c)4 d)9

(ii) Find the Average Waiting time for the following jobs if preemptive SJF scheduling algorithm is used [CO2]
Job J1 J2 J3 J4
Arrival Time 0 1 2 3
CPU Burst Time 3 3 1 2
a)2 b)1.5 c)1.75 d)2.25

(iii) Let m[0]…m[4] be mutexes (binary semaphores) and P[0] …. P[4] be processes. Suppose each process P[i] executes the following: [CO3]

```
wait (m[i]); wait(m[(i+1) mode 4]);
------
release (m[i]); release (m[(i+1)mod 4]);
```

This could cause
a) Thrashing b) Deadlock c) Starvation, but not deadlock d) None of the above

(iv)At a particular time of computation the value of a counting semaphore is 7. Then 20 P operations and 15 V operations were completed on this semaphore. The resulting value of the semaphore is : [CO3]
a) 42 b) 2 c) 7 d) 12

(v) Give references to the following pages by a program:
0 1 4 2 0 2 6 5 1 2 3 2 1 2 6 2 1 3 6 2
What is the working set $W(t, \Delta)$ with t equal to the time between 13th and 14th references and Δ equal to 5 references? [CO5]
a)W(t,Δ)={1,2,4} b) W(t,Δ)={1,2,3} c) W(t,Δ)={1,2,6} d) W(t,Δ)={2,5,6}

(vi) Calculate the number of page faults for the following reference string using LRU page replacement algorithm with frame size as 3.

Reference String: 7 0 1 2 0 3 0 4 2 3 0 3 [CO5]

a)8 b)10 c)7 d) 9

(vii) On a system using paging and segmentation, the virtual address space consists of up to 16 segments where each segment can be up to 2^{16} bytes long. The hardware pages each segment into 512 byte pages. How many bits in the virtual address specify the Entire Virtual address [CO5]

a)16 b)11 c)20 d)13

(viii) On a simple paged system, associative registers hold the most active page entries and the full page table is stored in the main memory. If references satisfied by the associative register take 100 ns, and references through the main memory page table take 180 ns, what must the hit ratio be to achieve an effective access time of 125 ns? [CO5]

a)31.25% b)35% c)62% d)68.75%

(ix) A computer has six tape drives, with n processes competing for them. Each process may need two drives. What is the maximum value of n for the system to be deadlock free? [CO2]

a) 6 b) 5 c) 4 d) 3

(x) On a system with 2^{24} bytes of memory and fixed partitions, all of size 65,536bytes. How many bits must the limit register have? [CO5]

a) 24 bits b)16 bits c) 8 bits d) None of the above

(xi) Consider four processes P1, P2, P3 and P4 with their arrival times and required CPU burst time(in milliseconds) as shown in the following table [CO2]

Process	P1	P2	P3	P4
Arrival time	0	2	3	5
CPU Burst time	15	6	7	5

How will these processes be scheduled according to FCFS scheduling algorithm? Compute the average waiting time.

a) 21.5 b) 13.5 c)21.75 d)13.75

b)

(xii) Consider four processes P1, P2, P3 and P4 with their arrival times and required CPU burst time(in milliseconds) as shown in the following table [CO2]

Process	P1	P2	P3	P4
Arrival time	0	2	3	5
CPU Burst time	15	6	7	5

How will these processes be scheduled according to FCFS scheduling algorithm? Compute the average turnaround time.

a) 21.5 b) 13.5 c)21.75 d)13.75

(xiii) Given memory partitions 100 KB, 500 KB, 200KB, 300KB and 600KB (in order). How would each of the first-fit, best-fit and worst-fit algorithms place processes of 212KB,

417KB, 112KB and 426KB (in order)? Which algorithm makes the most efficient use of memory? [CO5]

a)First Fit b) Best Fit c)Worst Fit d) All of the above

(xiv) Consider a paged memory system with eight pages of 8 KB page size each and 16 page frames in memory. Using the following page table, compute the physical address for the logical address 18325. [CO5]

Page No.	Frame No.
7	1010
6	0100
5	0000
4	0111
3	1101
2	1011
1	1110
0	0101

a)92051 b) 92053 c)82053 d)92054

(xv) Consider a paging system with the page table stored in main memory. If a memory reference takes 200 nanoseconds, how long does a paged memory reference take?(Assume that finding a page table entry in the associative registers takes zero time, if the entry is there.) [CO5]

a)400 nanoseconds b) 250 nanoseconds c) 450 nanoseconds d) 650 nanoseconds

(xvi) Consider a paging system with the page table stored in main memory. If we add associative registers, and 75 percent of all page-table references are found in associative registers, what is the effective memory reference time? (Assume that finding a page table entry in the associative registers takes zero time, if the entry is there.) [CO5]

a)400 nanoseconds b) 250 nanoseconds c) 450 nanoseconds d) 650 nanoseconds

(xvii) On a simple paging system with 2^{24} bytes of physical memory, 256 pages of logical address space, and a page size of 2^{10} bytes. How many bits are in logical address? [CO5]

a)18 b)24 c)14 d) 256

(xviii) On a simple paging system with 2^{24} bytes of physical memory, 256 pages of logical address space, and a page size of 2^{10} bytes. How many bits are in physical address? [CO5]

a)18 b)24 c)14 d) 256

(xix)On a simple paging system with 2^{24} bytes of physical memory, 256 pages of logical address space, and a page size of 2^{10} bytes. How many bits in the physical address specify the page frame? [CO5]

a)18 b)24 c)14 d) 256

(xx) On a simple paging system with 2^{24} bytes of physical memory, 256 pages of logical address space, and a page size of 2^{10} bytes. How many entries are in the page table? [CO5]
a)18 b)24 c)14 d) 256

Soumitra Roy

Signature of the Paper Setter/Moderator

Answer Key:

Group – A

1. (i)	d)	(ii)	d)	(iii)	a)	(iv)	c)	(v)	b)	(vi)	b)
(vii)	a)	(viii)	c)	(ix)	b)	(x)	b)	(xi)	a)	(xii)	b)
(xiii)	c)	(xiv)	b)	(xv)	a)	(xvi)	b)	(xvii)	c)	(xviii)	c)
(xix)	a)	(xx)	a)	(xxi)	c)	(xxii)	b)	(xxiii)	c)	(xxiv)	b)
(xxv)	c)	(xxvi)	d)	(xxvii)	c)	(xxviii)	b)	(xxix)	b)	(xxx)	b)

Group – B

2. (i)	a)	(ii)	c)	(iii)	b)	(iv)	b)	(v)	b)	(vi)	d)
(vii)	c)	(viii)	d)	(ix)	b)	(x)	b)	(xi)	c)	(xii)	b)
(xiii)	b)	(xiv)	b)	(xv)	a)	(xvi)	b)	(xvii)	a)	(xviii)	b)
(xix)	c)	(xx)	d)								