Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/B.Tech/CSE(O)/IT(O)/SEM-5/CS-501/2012-13

2012

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 any *ten* of the following : $10 \times 1 = 10$

i) A multi-user, multiprocessing operating system cannot be implemented on hardware that does not support

✓ a) address translation

✓ b) DMA for disk transfer

✓ c) at least two modes of CPU execution (privileged and non-privileged)

d) demand paging.

ii) A benefit of the microkernel organization is

✓ a) extensibility b) portability

c) flexibility d) all of these.

iii) The technique of gradually increasing the priority of a process that wait in a system for a long time is known as

a) blocking b) ageing

c) starvation d) convoy effect.

iv) Which of the following reduces degree of multiprogramming ?

a) Long-term scheduler b) Mid-term scheduler

c) Short-term scheduler d) Al of these.

v) A critical section is a program segment

a) which avoids deadlock

b) which should run n a certain specified amount of time

c) which shared resources that are accessed

d) which must be enclosed by a pair of semaphores operation, *p* and *v*.

vi) A c mputer system has 6 tape drives, with *n* processes competing for them. Each process may need 2 tape drives. The maximum value of *n* for which the system is guaranteed to be deadlock free is

a) 6 b) 5

c) 4 d) 3.

vii) Banker's algorithm solves the problem of

a) deadlock avoidance b) context switching

c) deadlock recovery d) mutual exclusive.

viii) An address generated by the CPU is commonly referred to as

a) logical address b) physical address

c) relational address d) virtual address

ix) Which of the following page replacement algorithms suffers from Belady's anomaly ?

a) Optimal replacement b) FIFO

c) LRU d) Both (a) and (c).

x) Which of the following RAID levels implements some form of parity calculations to introduce redundancy ?

a) RAID Level 2 b) RAID Level 4

c) RAID Level 6 d) All of these.

xi) The time to move the disk arm to the desired cylinder in a hard disk is known as

a) Rotainaly latency b) Positioning time

c) Indexed d) Hashed.

GROUP – B

(Short Answer Type Questions)

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

2. a) What is race condition ?

   b) Explain Peterson solution for avoiding race condition. 2 + 3

3. a) Why are page sizes always power of 2 ?

   b) Consider a logical address space of eight pages of 1024 words each, mapped onto a physical memory of 32 frames.

      i) How many bits are there in the logical address ?

      ii) How many bits are there in the physical address ? 3 + 2

4. What are co-operating processes ? Discuss the advantages of co-operating proce s. 2 + 3

5. What is priority s heduling ? Can SJF scheduling be considered as pr ority scheduling ? Justify. 3 + 2

GROUP – C

(Long Answer Type Questions)

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

6. a) What is context switching ? Why is it considered to be an overhead ? 2 + 2

   b) All unused states may not lead to deadlock. "Why or why not" ? 3

c) Consider the following set of processes, with the length of the CPU-burst time given in millisecond :

Process	*Burst Time*	*Arrival Time*	*Priority*
P_1	10	0	3
P_2	1	1	1
P_3	2	2	3
P_4	1	2	4
P_5	5	3	2

i) Draw 2 Gantt charts Illustrate the execution of these processes a non-pre-emptive priority (a smaller prior ty number implies a higher priority) and a RR (quantum = 1) scheduling.

ii) What is turnaround time of each process for each of the scheduling algorithms ? Also find the average turnaround time of the system ?

iii) What are the average waiting time for 2 algorithms ? 3 + 1 + 1

d) Mention one characteristic each of time sharing system, Batch processing system and distributed system. 3

7. a) Differentiate between multiprogramming and multitasking OS. 2

   b) What is semaphore ? What are the different types of semaphore ? 2 + 3

   c) What is the Dining philosopher problem ? Device an algorithm to solve the problem using semaphore. 3 + 3

   d) Differentiate between starvation and deadlock. 2

8. a) What are TLB ? Draw the diagram of paging hardware with TLB. 1 + 2

   b) i) Consider a paging system with the page table stored a paged mem ry reference take.

      ii) If we add TLBs and 75 per cent of all page-table references a e found in the TLBs what is the effective memo y reference time ? (Assume that finding a page table Entry in the TLBs takes zero time, f the entry is there.) 2 + 2

   c) Giv n memory partitions of 100 kb, 500 kb, 200 kb and 600 kb (in order), how would each of the first fit, best-fit and worst-fit algorithms place process of 212 kb, 417 kb, 112 kb and 426 kb (in order) ? Which algorithm makes the most efficient use of memory. 2

   d) What is dynamic loading ? What is dynamic linking ? 3 + 3

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

a) RR scheduling

b) DMA and its utility

c) RAID

d) Middle term scheduler

e) Linked file allocation technique

f) Boot block and bad block.