ENGINEERING & MANAGEMENT EXAMINATIONS, DECEMBER – 2007

OPERATING SYSTEM & SYSTEMS SOFTWARE

SEMESTER – 3

Time : 3 Hours] [Full Marks : 70

GROUP – A

(Multiple Choice Type Questions)

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

i) Mutual exclusion problem occurs between

a) two disjoint processes that do not interact

b) processes that share resources

c) processes that do not share resources

d) none of these. ☐

ii) Dirty bit is used to show the

a) page with corrupted data

b) the wrong page in the memory

c) page that is modified after being loaded into cache memory

d) page that is less frequently accessed. ☐

iii) Memory protection is of no use in a

a) single user system

b) non-multiprogramming system

c) non-multitasking system

d) none of these. ☐

iv) 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) one tries to divide a number by 0.

v) Throughput is

a) process that is completed per unit time

b) completion of the whole process

c) time for waiting in ready queue

d) waiting to get into memory.

vi) Context switching is a

a) part of spooling b) part of polling

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

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

a) logical address b) physical address

c) relational address d) virtual address.

viii) System calls are usually invoked by

a) a software interrupt

b) polling

c) an indirect jump

d) a privileged instruction.

ix) Compaction is used to solve the problem of

a) external fragmentation b) internal fragmentation

c) both of these d) none of these.

x) Which is not a page replacement algorithm ?

a) LRU b) FIFO

c) Round-Robin d) None of these.

GROUP – B

(Short Answer Type Questions)

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

2. What is context switching ? State the steps that are taken for context switching between two processes. 1 + 4

3. Consider the following set of processes. CPU burst time of them are given below in milli-second.

Process	*CPU Burst Time*
P1	15
P2	5
P3	7
P4	10

Draw the Gantt Chart for R.R. scheduling where time quantum q = 5 millisecond. Calculate the average waiting time. 5

4. What is demand paging ? What is the advantage of demand paging over the swapping ? 5

5. Explain the following : 5

a) Paging & segmentation

b) Swapping.

6. Differentiate between process and thread. 5

GROUP – C

(Long Answer Type Questions)

Answer any *three* questions. $3 \times 15 = 45$

7. What is resource allocation graph ? How will deadlock be prevented ? 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 :

a) What is the content of the matrix need ?

b) Is the system in a safe state ?

c) If a request from P_1 arrives for (0, 4, 2, 0), can the request be granted immediately ? $3 + 4 + 2 + 3 + 3$

8. a) What is Dining Philosopher's problem ? Describe an algorithm to solve the problem using semaphore.

b) State and explain Banker's algorithm and its application in O.S. with a suitable example. $5 + 10$

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 semaphore. $10 + 5$

10. a) Explain the concept of overlay managmeent system with diagram.

b) What are co-operative processes and race condition ? Explain the solution of producer-consumer problem using semaphore. Explain the advantages of monitor.

c) Consider the following sequence of memory reference for a 460 word program :

10, 11, 104, 170, 309, 185, 245, 246, 434, 458, 364.

Give the reference string assuming a page size of 100 words. $4 + 7 + 4$

11. What are the advantages and disadvantages of Assembly Language program ? Explain the functions pass 1 and pass 2 of two-pass Assembler. Why are nemonic table and symbol table both required in synthesis phase of a two-pass assembler ? What is debugging system ? 3 + 4 + 5 + 3

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