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SYSTEM PROGRAMMING AND 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:

 $10 \propto 1 = 10$

- i) A thread is a
 - a) task b)

process

- c) program
- d) light-weight process.
- ii) What is not a function of the loader?
 - a) Relocation
- b) Allocation
- c) Loading
- d) Translation.

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- iii) Once a program is compiled, it can be loaded for execution
 - a) only from compiler generated starting address
 - b) anywhere in main memory
 - c) user needs to specify memory address
 - d) from address 'O' in main memory.
- iv) The system call to start a new process is
 - a) exec b)

fork

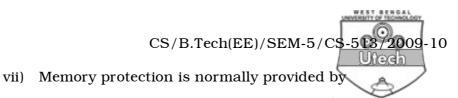
c) init

- d) none of these.
- v) 8085 microprocessor supports
 - a) 8-bit b)

4-bit

c) 32-bit

- d) 16-bit.
- vi) Which of the following remarks about assembler is are true?
 - a) Translates mnemonic instructions into machine code
 - b) design of an assembler is independent of source language
 - c) Both (a) & (b)
 - d) none of these.



- a) compiler
- b) user program
- c) operating system medules
- d) processor.
- viii) A critical section is a program segment
 - a) which should run in a certain specified amount of time
 - b) which avoids deadlocks
 - c) where shared resources are accessed
 - d) which must be enclosed by a pair of semaphores operations, P and V.
- ix) Which of the following provides an interface from user to operating system?
 - a) Kernel
- b) Shell
- c) Microkernel
- d) Monolithic kernel.
- x) Aging is considered to be a solution for
 - a) deadlock
- b) external fragmentation
- c) thrashing
- d) starvation.



(Short Answer Type Questions)

Answer any three of the following.



- 2. a) What is the difference between a compiler and interpreter?
 - b) Explain briefly the working of microprocessor. 1 + 4
- 3. Write down the four necessary conditions of deadlock. 5
- 4. Define the following terms :
 - a) Turnaround time
 - b) Rotational latency
 - c) Thrashing.

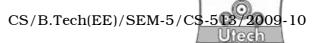
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- 5. a) What are the functions of operating system?
 - b) What is device driver?

3 + 2

- 6. a) What are the disadvantages of an absolute loading scheme?
 - b) What do you understand by spooling?
 - c) Give an example of a monolithic kernel operating system. 2 + 2 + 1

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GROUP - C

(Long Answer Type Questions)

Answer any three of the following.

- 3 ∞ 15 = 45
- 7. a) Explain the working of a two-pass assembler. Mention is advantages and disadvantages.
 - b) Given memory partitions of 100 K, 500 K, 200 K, 300 K and 600 K (in order). How would each of the first-fit, best-fit and worst-fit algorithms place processes of size 212 K, 417K, 112 K and 426 K (in order) ? Which algorithm makes the most efficient use of memory?
 - c) What is the difference between internal and external fragmentation? 6+6+3
- 8. a) How does a relocating loader work?
 - b) What are logical address and physical addresses?
 - c) What is busy waiting? What are the ways to avoid it?
 - d) For what type of operation is Direct Memory Access (DMA) useful? Justify your answer. 5 + 3 + 4 + 3

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

	Allocation	Max	Available
	ABCD	ABCD	ABCD
P_0	0012	0012	1520
P_{1}	1000	1750	
P_2	1 3 5 4	2 3 5 6	
P_3	0632	0652	
P_{4}	0014	0656	

Answer the following questions using 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 (0, 4, 2, 0), can the request be granted immediately?
- b) Consider a disk queue with requests for I/O to block on cylinders in the following order :

98, 183, 37, 122, 120, 17, 65, 67. (The disk head is intially at cylinder 53) SCAN and C-SCAN disk scheduling algorithm. Compare with respect to the above request. (2+3+3)+7

6

10	၁)	Consider	the	following s	et i	of :	nrocesses	
10.	a)	Consider	uic	Tonowing s	oct '	OI.	hrocesses	٠

Process	CPU Burst-time	Priority	Arrival Time
P_{1}	10	3	O Sandala Sandala
P_{2}	1	1	0
		(highest)	
P_3	2	3	1
$P_{\ 4}$	1	4	3
		(Lowest)	
P_{5}	5	2	6

Draw the Gantt chart using FCFS, SJF (both preemptive and non-preemptive), RR (ts=3) & preemptive priority scheduling. Calculate average waiting time in each case.

b) What do you mean by Process State? Explain with proper diagram.

8 + 5 + 2

- 11. a) What is effective access time? A paging system with the page table is stored in main memory.
 - i) if memory reference takes 200 ns, 200 how long does a paged memory reference take?
 - ii) If we add TLBs and 75% hit is successful, what is the effective memory reference time? (Assume that finding page-table entry in the TLBs take zero time, if the entry is there).
 - b) What is compaction? What are its drawbacks?
 - c) Mention the advantages and disadvantages of demand paging. (1+2+3)+4+5