B.TECH/IT/5TH SEM/INFO 3101/2016

OPERATING SYSTEMS CONCEPTS
(INFO 3101)

Time Allotted : 3 hrs **Full Marks : 70**

Figures out of the right margin indicate full marks.

Candidates are required to answer Group A and any 5 (five) from Group B to E, taking at least one from each group.

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

Group – A
(Multiple Choice Type Questions)

1. Choose the correct alternative for the following: **10 × 1 = 10**

(i) Which scheduling policy is most suitable for time-shared operating systems?
(a) Shortest Job First (b) Round Robin
(c) First Come First Served (d) Elevator.

(ii) An address generated by the CPU is commonly referred to as
(a) logical address (b) physical address
(c) virtual address (d) none of the above.

(iii) What is the drawback of banker's algorithm?
(a) Processes rarely know how much resource they will need
(b) The number of processes changes as time progresses
(c) Resource once available can disappear
(d) All of the mentioned.

(iv) A problem encountered in multitasking when a process is perpetually denied necessary resources is called
(a) deadlock (b) starvation
(c) inversion (d) aging.

(v) A process stack does not contain
(a) function parameters (b) local variables
(c) return addresses (d) PID of child process.

(vi) Thrashing
(a) reduces page IO
(b) decreases the degree of multiprogramming
(c) implies excessive page IO
(d) improves the system performance.

(vii) Which of the following is a Inter Process Communication mechanism?
(a) PIPE (b) Message Queue
(c) Shared memory (d) All of these.

(viii) In UNIX, each process is identified by its
(a) Process Control Block (b) Device Queue
(c) Process Identifier (d) None of these.

(ix) Run time mapping from virtual to physical address is done by
(a) memory management unit (b) CPU
(c) PCI (d) none of the mentioned.

(x) The first block of a file system is
(a) data block (b) address block
(c) boot block (d) inode block.

Group – B

2. (a) Compare Zombie Process and Orphan Process with proper example.

(b) What is Cascaded Termination and when is this required?

(c) Compare the functionalities of fork() and vfork() system call.

(d) Draw and explain process lifecycle which depicts all active and suspended states and transition paths.

3 + (1 + 2) + 2 + 4 = 12

3. (a) What is micro kernel? Explain with diagram.

(b) Differentiate Interrupt and Trap. What is System Call?

(c) "Context switching is an overhead to the system" – Do you agree with this statement? Explain your answer with reason.

(d) Explain different multithreading models briefly.

(e) Differentiate between Thread and Process.

2 + (2 + 2) + 2 + (2 + 2) = 12

Group – C

4. (a) Write down four necessary condition of Deadlock. Differentiate between Deadlock Prevention and Deadlock Avoidance.

(b) Consider the following snapshot of a system.

Process	Allocation A B C D	MAX A B C D	Available 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	

(i) Is the system in Safe state?

(ii) If a request from process P1arrives for (0 4 2 0) can the request be granted immediately?

(2 + 2) + (4 + 4) = 12

5. (a) What is semaphore? What are the different types of semaphore?

(b) Device a solution to Readers Writers problem using semaphore.

(c) A system has 12 magnetic tape drives and 3 processes: P0, P1, and P2. Process P0 requires 10 tape drives, P1 requires 4 and P2 requires 9 tape drives.

Process	Currently allocated
P0	5
P1	2
P2	2

Find out the safe sequence is there is any. If Process P0 requires 11 tape drives instead of 10, will your answer differ? Explain.

(2 + 2) + 4 + (2 + 2) = 12

Group – D

6. (a) What do you mean by dynamic loading and dynamic linking? What are the advantages of dynamic loading and linking over static ones?

(b) What is the difference between external and internal fragmentation? Explain with example.

(c) Given memory partitions of a hard disk 100kb, 600kb, 200kb, 500kb, 300kb, 150kb (in order). How would each algorithm of first fit best fit and worst fit will accommodate the processes requiring 132kb, 376kb, 212kb, 478kb, 50kb (in order)? Which algorithm will give the best result?

(3 + 2) + 3 + 4 = 12

7. (a) How the use of TLB improves the performance of system? Explain with diagram.

(b) What are the major difference between paging and segmentation?

(c) How page faults are handled?

(d) If the primary memory is divided into 4 pages and the request sequence of pages is 3 1 3 4 2 4 1 2 3 1 2 4 2 3 1 3 1 1 4 4; then using LFU page replacement algorithm, what will be the rate of page hit and page miss?

3 + 2 + (2 + 2) + 3 = 12

Group – E

8. (a) What is DMA? How it improves the performance of the computer?

(b) State the difference between vectored and non-vectored interrupt.

(c) Draw and explain the block diagram showing PC Bus Structure.

(2 + 2) + 3 + 5 = 12

9. (a) Describe Polling and Handshaking Protocol.

(b) What is a virtual file system?

(c) State and explain the different techniques of free space management as adapted during file system management.

(2 + 3) + 3 + 4 = 12