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 3 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 LRU 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 blocking and non-blocking IO.

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

$$(2 + 2) + 3 + 5 = 12$$

9. (a) Describe Polling and Handshaking Protocol in brief.

(b) What is encryption? How it enhances security?

(c) What is Post Scanning?

(d) Write short notes on (any two):
   (i) Trojan Horse
   (ii) Logic Bomb
   (iii) Vectored and Non- Vectored Interrupt.

$$(2+2)+ (1 + 1)+ 2 + (2 × 2) = 12$$

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) To avoid the race condition, the number of processes that may be simultaneously inside their critical section is
   (a) 1   (b) 0   (c) 2   (d) 3.

   (ii) Let the page fault service time be 10ms in a computer with average memory access time being 20ns. If one page fault is generated for every 10^6 memory accesses, what is the effective access time for the memory?
   (a) 21ns   (b) 30ns   (c) 23ns   (d) 35ns.

   (iii) The LRU algorithm
   (a) pages out pages that have been used recently
   (b) pages out pages that have not been used recently
   (c) pages out pages that have been least used recently
   (d) pages out the first page in a given area.

   (iv) Where does the swap space reside?
   (a) RAM   (b) Disk   (c) ROM   (d)None.

   (v) Which of the following need not necessarily be saved on a context switch between processes?
   (a) General purpose registers   (b) Translation look-aside buffer
   (c) Program counter   (d) All of the above.

(vi) Thrashing can be avoided if
  (a) the pages, belonging to the working set of the programs, are in main memory
  (b) the speed of CPU is increased
  (c) the speed of I/O processor is increased
  (d) all of the above.

(vii) Fragmentation of the file system
  (a) occurs only if the file system is used improperly
  (b) can always be prevented
  (c) can be temporarily removed by compaction
  (d) is a characteristic of all file systems.

(viii) Which of the following is NOT a valid deadlock prevention scheme?
  (a) Release all resources before requesting a new resource
  (b) Number the resources uniquely and never request a lowered numbered resource than the last one requested.
  (c) Never request a resource after releasing any resource
  (d) Request and all required resources be allocated before execution.

(ix) A process executes the code
  fork(); fork(); fork();
  (a) 3   (b) 4   (c) 7   (d) 8.

(x) When hardware is accessed by reading and writing to the specific memory locations, then it is called
  (a) port-mapped I/O   (b) controller-mapped I/O
  (c) bus-mapped I/O   (d) memory-mapped I/O.

Group – B

2. (a) With the help of C program explain orphan process and zombie process.

(b) Draw and explain modified process state diagram. Why is it introduced?

(c) What is the purpose of Interrupt? What are the differences between TRAP and Interrupt?

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

3. (a) Explain the benefits of multithreaded programming. What is cascading termination?

(b) Differentiate between symmetric multiprocessor and asymmetric multiprocessor. Discuss many to many thread model.

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

Group – C

4. (a) Discuss Peterson solution to solve critical section problem. How Test and Set instructions are implemented?

(b) Prove that if we able to avoid circular wait then deadlock will never happen.
A system has five processes P1 through P5 and four resource types R1 through R4. There are 2 units of each resource type. Given that:
P1 holds 1 unit of R1 and requests 1 unit of R4
P2 holds 1 unit of R3 and requests 1 unit of R2
P3 holds one unit of R2 and requests 1 unit of R3
P4 requests 1 unit of R4
P5 holds one unit of R3 and 1 unit of R2, and requests 1 unit of R3

Show the resource graph for this state of the system. Is the system in deadlock, and if so, which processes are involved?

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

5. (a) Consider the following set of processes with CPU burst time given in millisecond.

Process	Burst time	Priority
P1	10	3
P2	1	1
P3	2	3
P4	1	4
P5	5	2

Calculate turn around time and average waiting time for Round Robin and Priority scheduling.

(b) What is the job of Medium term scheduler?

(c) Explain Dinning Philosopher problem and a suitable solution of it.

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

Group – D

6. (a) Sometime worst fit is better than best fit–Justify. Why segmentation and paging are sometimes combined into one scheme?

(b) Suppose a disk drive has 300 cylinders numbered 0 to 299. The current head position of disk is at 84. The queue of pending request in FIFO order is 36,79,15,125,280,270,89,180. Plot the head movements and calculate average cylinder movements for the following.
i) SSTF   ii) C-Scan

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