(3 Hours)   Total Marks: 80

N.B.   1) Question **no.1 is compulsory**

2) Solve any **Three** questions from remaining five.

3) Assume suitable data wherever required.

Q 1) Answer any four   (20)

a) Describe various types of system calls for performing different tasks.
b) What are the four necessary conditions of deadlock prevention?
c) Differentiate between multiprogramming and multiprocessing.
d) Explain pre-emptive and non-pre-emptive scheduling.
e) What is a semaphore? Explain busy waiting semaphores.

Q 2) a) Consider the following page reference string:

1, 2, 3, 4, 2, 1, 5, 6, 2, 1, 2, 3, 7, 6, 3, 2, 1, 2, 3, 6.

How many page faults would occur for the following replacement algorithms, assuming one, two, three, four, five, six, or seven frames? Remember all frames are initially empty, so your first unique pages will all cost one fault each.

• LRU , FIFO and Optimal replacement.   (10)

b) What do you mean by a critical section? Using semaphores , write a solution to readers and writers problem that gives priority to readers.   (10)

Q 3) a) Consider the following system snapshot using data structures in the Banker's

algorithm, with resources A, B, C, and D, and process P0 to P4.

	MAX				Allocate				NEED				Available			
	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D
P0	6	0	1	2	4	0	0	1								
P1	1	7	5	0	1	1	0	0								
P2	2	3	5	6	1	2	5	4								
P3	1	6	5	3	0	6	3	3								
P4	1	6	5	6	0	2	1	2								
													3	2	1	1

Using Banker's algorithm, answer the following questions.

(i)   How many resources of type A, B, C, and D are there?
(ii)   What are the contents of the Need matrix?
(iii)   Is the system in a safe state? Why

(iv)   If a request from process P4 arrives for additional resources of (1,2,0,0,), can the Banker's algorithm grant the request immediately? Show the new system state and other criteria.   (10)

b) Explain the process states by using processes state transition diagram.   (10)

Q 4) a) Explain any 3 allocation schemes that exist for allocating secondary

    storage to files.   (10)

  b) What is directory? What are the different ways to implement a directory?   (10)

Q 5) a) What are the methods for selecting a disk scheduling algorithm?

    Explain the disk scheduling algorithms?   (10)

b) Suppose the head of moving-head disk with 200 tracks, numbered 0 to 199 is currently serving a request at track 143 and has just finished a request at track 125. if the queue of requests is kept in the FIFO order 86, 147, 91, 177, 94, 150, 100, 175, 130 What is total head movement to satisfy these request for the following disk scheduling algorithms?

i) FCFS ii) SSTF iii) C-SCAN   (10)

Q 6) a) Compare the following main memory organization schemes : contiguous memory allocation, pure segmentation, and pure paging with respect to the following issues:

i) External fragmentation ii) Internal fragmentation iii) Ability to share code across processes.

         (10)

b) Write an algorithm to implement a semaphore using:-

    i) The Swap instruction ii) The Test and set instruction.   (10)

NB : 1) **Question 1** is **compulsory**.
2) Attempt any **three** questions from the **remaining** questions.
3) **Assume** suitable **data** wherever applicable.
4) **Draw figures** wherever applicable.

1	(a)	Explain different applications of computer graphics.	5
	(b)	Explain different types of virtual reality systems.	5
	(c)	Prove that two successive rotation are additive.	5
	(d)	Explain fractals	5
2	(a)	Explain Virtual reality architecture.	10
	(b)	Explain Bresenham's line drawing algorithm. How it is different from DDA	10
3	(a)	Find the Bézier curve given 4 control points (25,25), (45,40), (60,45) and (90,10) using the step size as 0.1.	10
	(b)	List various polygon filling algorithms and explain boundary fill in detail.	10
4	(a)	Explain geometric and kinematic modeling in detail	10
	(b)	Explain Sutherland Hodgeman polygon clipping algorithm.	10
5	(a)	Explain 2D transformations with suitable example for each.	10
	(b)	Explain Cohen Sutherland line clipping algorithm with example.	10
6		Write short note on **(any four)**	20
	(a)	Antialiasing techniques	
	(b)	Application of Virtual Reality	
	(c)	Text Clipping	
	(d)	VR toolkit	
	(e)	Morphing techniques	

****

N.B.:- (1) Question No. **1** is **Compulsory**.

(2) Solve any **three** questions from the remaining **five** questions.

(3) **Figures** to the **right** indicate **full** marks.

(4) Make **suitable** assumptions wherever **necessary** and state them **clearly**.

1. (a) Define Embedded System. Discuss various components of embedded system. 5
   (b) What is Semaphore? Explain Mutex in RTOS. 5
   (c) Compare AJMP, SJMP, LJMP instructions of 8051. 5
   (d) Explain the brief Real Time operating Systems 5

2. (a) Explain in detail ARM 7 pipelining 10
   (b) Explain the Timer/ Counter of IC 8051. 10

3. (a) Write an assembly language program for 8051 microcontroller to multiply two 8 10
       bit numbers stored external memory locations 4000H and 4001 H. Send the result
       on PORT 1 and PORT 3.
   (b) Explain CPSR register of ARM 7 processor. 10

4. (a) Explain the addressing modes of ARM 7 processor. 10
   (b) Explain the hardware and software interrupts of 8051 microcontroller 10

5. (a) Explain Internal memory organization of 8051. 10
   (b) Explain the addressing modes of 8051 microcontroller. 10

6.   Write note on (**any two**): 20
   (a) Automated meter reading system.
   (b) Digital Camera.
   (c) Serial communication of 8051.
   (d) Assembler directives.