(3 Hours) **Total Marks: 80**

N.B.: (1) Q.1 is compulsory.
(2) Attempt any three out of remaining five.
(3) Figures to the right indicate full marks.

Q 1A) Consider the following snapshot: **[10]**

Processes	Allocation			Max			Available		
	R1	R2	R3	R1	R2	R3	R1	R2	R3
P0	0	1	0	7	5	3	3	3	2
P1	0	0	0	3	2	2			
P2	3	0	2	9	0	2			
P3	2	1	1	2	2	2			
P4	0	0	2	4	3	3			

Using Banker's algorithm
- What is the context of matrix need?
- Is the system in safe state? Give the sequence.

Consider the request from process P1 arrives for (1,0,2). Can the request be immediately granted?

B) What is Operating System? Write the functions of Operating System. What are the different types of Operating System? **[10]**

Q 2 A) What is Thread? Explain various kinds of threads in detail. **[10]**

B) What do you mean by concurrency control? Explain the use of semaphore and monitors in concurrency control with example. **[10]**

Q 3A) Given a reference string to the following pages by a program 2,1,3,3,2,8,7,8,1,2,3,1,4,1,5,6,2,6,3,5,6,7,8,7,8,3,5,3,8,4,4,3,4. How many page faults will occur for the following page replacement algorithms, assuming three frames? **[10]**
- LRU replacement
- FIFO replacement

Optimal replacement

B) Explain the different file allocation methods. **[10]**

Q 4A) Suppose a disk drive has 200 cylinders, numbered 0 to 199. The driver is currently serving request at cylinder 100 and previous request was a cylinder 150. The queue is pending request in FIFO order is :- **[10]**
27,129,110,186,147,41,10,64,120
What is the total head movement under following scheduling algorithm?
(i)FCFS ii) SSTF iii) SCAN iv) C-SCAN

Q 4 B) What is a scheduler? Explain the primary objective of scheduling. How many types of scheduler coexist in an Operating System? Explain it with the help of diagram. **[10]**

Q 5A) What is dynamic and fixed partition? What are the problems with them and how can we solve these problems? Explain with suitable example. **[10]**

B) For the processes listed below the table, draw Gantt chat and calculate average waiting time and average turnaround time using :- **[10]**

- FCFS (first come first serve)
- SJF (Shortest Job First) in both condition pre-emptive and non-pre-emptive
- Round – robin (Quantum = 2)

Processes	Arrival time(ms)	Burst time(ms)
P1	0	9
P2	1	5
P3	2	7
P4	3	3

Q 6A) Write short notes on: (**Any Four**) **[20]**

- Buffering and Spooling
- Process Control Block
- Clock Hardware and clock software
- Linker and Loader
- Swap-space management
