

(3 Hours)

[Total Marks: 80]

N.B. : (1) Question No. 1 is **compulsory**(2) Solve any **three** questions out of remaining **five**

(3) Make suitable assumption if necessary

1. Solve any four out of five:

1. (a) Draw and explain process state transition diagram with all possible transitions. 5
- (b) Explain functions and services of an operating System. 5
- (c) Differentiate between internal and external fragmentation. 5
- (d) Explain the terms: Critical Section and Race Condition 5
- (e) Differentiate user level and kernel level threads. 5
2. (a) What is deadlock? Explain necessary and sufficient conditions for deadlock. How to avoid deadlock? 10
- (b) Explain paging in detail. Describe how logical address is converted into physical address. 10
3. (a) In system using paging and segmentation, the virtual address space consists of upto 8 segments where each segment can be upto  $2^{29}$  bytes long. The hardware pages each segment into 256 bytes pages. How many bits in virtual address specify the (1) segment number (2) page number (3) offset within page (4) entire virtual address 10
- (b) Consider a system with 5 processes and 3 resource types. At a time following snapshot of the system has been taken: 10

Process ID	Allocated			Maximum			Available		
	R1	R2	R3	R1	R2	R3	R1	R2	R3
P1	1	1	2	4	3	3	3	1	0
P2	2	1	2	3	2	2			
P3	4	0	1	9	0	2			
P4	0	2	0	7	5	3			

P5	1	1	2	11	2	3
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1) Determine the total amount of resources of each type. 2) compute the need matrix 3) determine if the state is safe or not using Banker's algorithm,

4. (a) Discuss programmed I/O and DMA in detail. 10  
 (b) Consider following set of processes with the length of CPU burst time given in ms: 10

Process	Arrival Time	Burst Time
P1	0	6
P2	1	4
P3	3	5
P4	5	3

Draw the gantt chart for: FCFS , SJF (preemptive and non-preemptive) and RR (quantum=2). Calculate turn around time and waiting time in each case.

5. (a) Assume that the disk head is initially positioned over track 100. For the disk space requests of 27,129,110,186,147,41,10,64 and 120. Show how disk scheduling is carried out for SCAN, SSTF and LOOK. Calculate the average seek length and show the tracking of the requests. 10

(b) Explain different file access methods in detail. 10

6. Write notes on the following(any four):

- (a) RAID 5  
 (b) Android OS 5  
 (c) I-node 5  
 (d) RTOS 5  
 (e) System Calls 5

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