(3 Hours) [Total Marks : 100]

N.B. 1) Question No. 1 is compulsory.
   2) Attempt any four questions out of remaining six questions.

1.a) What are the main advantages   for an operating system designer of using   (10)
   virtual machine architecture ? what is the main advantage for a user.

b) Consider the following snapshot of the system.   (10)

Process	Allocation				Max				Available			
	A	B	C	D	A	B	C	D	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				

   Answer the following questions using banker's algorithm.
      i)Determine the total amount of resource of each type.
      ii) What is the content of need matrix?
      iii)Determine if   the system is in safe state using safety algorithm.
      iv)if a request from process p1 arrives for (0,4,2,0) can the request be
      granted immediately.

2.a) On a disk with 1000 cylinders, numbers 0 to 999, compute the number of   (10)
   tracks the disk arm must move to satisfy all the requests in the disk queue.
   Assume that the last request serviced was at track 345 and head is moving
   towards track 0. The queue in FIFO order contains requests for the following
   tracks:
   123, 874, 692, 475,105,376. Perform the computation for following disk
   Scheduling algorithms.
   i)FIFO   ii)SSTF   iii)SCAN

   b) What is RTOS? Give the classification of RTOS and comparison of any two   (10)
   RTOS.

3.a) Consider the following snapshot of the process to be executed. Draw the   (10)
   Gantt chart and   determine the average waiting time and average turnaround
   time for FCFS, SJF(preemptive), SJF(nonpreemptive) and round robin
   (quantum=2) scheduling algorithm.

Process	Arrival Time	Burst Time
P1	0	4
P2	2	5
P3	4	6
P4	5	2
P5	6	1

   b) Describe Inode and FAT structure.   (10)

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Q4.a) On a simple paging system with 2^{24} bytes of physical memory 256 pages   (10)
    of logical address space and page size of 2^{10} bytes.
    i) Determine the no of bits in physical address. Specify the page frame?
    ii) How many entries are present in page-table?
    iii) How many bits are in logical address space?
    b) Suggest an implementation of binary semaphores that avoids busy waiting.   (10)

Q5. a) What is a kernel ? Describe briefly the approaches of designing kernel.   (10)
    b) Consider the following page traces in a demand paging system with 3 page   (10)
    frames.
    2,3,1,1,2,3,4,6,2,3,4,3,1,2,3.
    Determine the number of page faults and hit ratio using FIFO and LRU page
    replacement algorithm.

6.a) Describe programmed IO and DMA.   (10)
    b) Consider a disk having 8 surfaces. Each surfaces having an outer diameter of   (10)
    16cm and inner of 6cm and inner track space is 0.2mm.There are 32 sectors in
    each track. If disk address for reading a byte or sector on any surface track of
    disk is 27bits. What is sector size in bytes if disk rotates at 3600rpm. What is
    effective data transfer rates in bytes/sec?

7.   Write short notes on the following : —   (20)
    i) Monitor
    ii) Distributed O.S.
    iii) Network O.S.
    iv) Symbian O.S.