ECS-501

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 110501

Roll No.

B. Tech.

(SEM. V) (ODD SEM.) THEORY EXAMINATION, 2014-15

OPERATING SYSTEM

Time : 3 Hours] [Total Marks : 100

Note : (i) Attempt All Questions.

(ii) All Question carry Equal marks.

(iii) Be precise in your answer.

1 Attempt any **four** : 4×5=20

(a) Enumerate various OS components with their functions in brief.

(b) Why operating system is needed? Justify "Operating system is the control program of the system".

(c) Differentiate between (with one suitable example):

(i) Interactive and Batch Processing System.

(ii) Multiprogramming and Time Sharing System.

(d) Explain the difference between Monolithic and Microkernel systems with their advantages and disadvantages. What are the benefits of having kernel as Reentrant in the systems?

(e) Enumerate the advantages of the layered approach to system design? Also, Explain virtual machine architecture in detail.

(f) What are Semaphores? What is the usage of Semaphores? Explain with a suitable example.

Attempt any four : 4×5=20

(a) Draw & explain Process control block (PCB) with all its components. Also brief why context switching is an overhead in the system?

(b) Explain short term, medium term and long term scheduling. Describe the differences among them.

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(c) Give the constraints given by Dijkstra that are imposed on any solution for critical section problem. Also, give Dekker's solution for two process and check whether it satisfies the above constraints.

(d) Give reader/writer problem and its solution using semaphores.

(e) Draw the labeled process state transition diagram describing the various process states. Also, give the different reasons for process termination.

(f) Explain the need of process synchronization. How can the interprocess communication be achieved?

Attempt any Two: **2×10=20**

(a) Consider the following set of processes:

Process	Arrival time	Burst Time	Priority
P1	0	6	3
P2	1	4	1
P3	2	5	2
P4	3	8	4

(i) Draw Gantt charts and find the average waiting time and average turnaround time using Shortest remaining time first (SRTF), Round robin (time quantum=3) and preemptive priority scheduling.

(ii) If the scheduler takes 0.2 unit of CPU time in context switching, calculate the percentage of CPU time wasted in each case.

(b) (i) What are deadlocks? Explain the different methods for dealing with the deadlocks.

(ii) Consider the following snapshot of a system :

	Allocation			Max			Available		
	R1	R2	R3	R1	R2	R3	R1	R2	R3
P1	2	2	3	3	6	8	4	3	10
P2	2	0	3	4	3	3			
P3	1	2	4	3	4	4			

Answer the following questions using the banker's algorithm :

(a) What is the content of the matrix Need?

(b) Is the system in a safe state?

(c) If a request from process P2 arrives for (2,1,0), can the request be granted immediately?

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(c) What do you mean by a thread? How it is different from a process? Explain various thread models with their relative advantages and disadvantages.

4 Attempt any Two : **2×10=20**

(a) (i) Explain the difference between internal and external fragmentation by taking suitable example. Which one occurs in Pure paging, pure segmentation, Demand paging and Paged segmentation?

(ii) What is thrashing? When it does occur? Describe the actions taken by the operating system when a page fault occurs.

(b) (i) What do you mean by Belady's anomaly? Which algorithm suffers from Belady's anomaly?

(ii) Consider the following page reference string :
1, 2, 3, 4, 2, 1, 5, 6, 2, 1, 2, 1, 5, 6
How many page faults would occur for the following replacement algorithms, assuming three frames.
(1) LRU page replacement
(2) FIFO page replacement
(3) Optimal page replacement

(c) Explain paged segmentation with its advantages and disadvantages.
In a paged segmented system, a virtual address consists of 32 bits of which 12 bits are for displacement, 11 bits are segment number and 9 bits are page number. Calculate the following :
(a) Page size
(b) Max Segment size
(c) Max number of pages
(d) Max number of segments.

Attempt any Two : **2×10=20**

(a) Discuss various file allocation strategies for disk space management. What criteria should be used in deciding which strategy is best utilized for a particular file?

(b) Suppose that a disk has 500 cylinders. The drive is currently serving a request at cylinder 125 and the previous request was at cylinder 100. The queue of pending request in FIFO order is
80, 147, 13, 177, 48, 409, 22, 175, 301
What is the total distance that the disk arm moves for the following Disk scheduling algorithm :
(1) SSTF
(2) LOOK
(3) C-SCAN

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(c) Differentiate between :

(1) Blocking and non-blocking I/O.

(2) Block and character devices.

(3) Linked list and bit map approach for free space memory management.

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