B. Tech. V Sem. (Main/Back) Exam., Nov.-Dec.-2016
Computer Science & Engineering
5CS5A Operating Systems
Common with CS, IT

Time: 3 Hours

Maximum Marks: 80
Min. Passing Marks Main: 26
Min. Passing Marks Back: 24

Instructions to Candidates:

Attempt any five questions, selecting one question from each unit. All questions carry equal marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.

Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL _____   2. NIL _____

UNIT – I

Q.1 (a) What are the different services provided by the operating system? Explain all of them in detail?   [8]

(b) What are the five major activities of an operating system with regard to file management?   [8]

OR

Q.1 (a) What are the two models of interprocess communication? What are the strengths & weakness of the two approaches?   [8]

(b) What are the difference between user level threads & kernel Level threads, under what circumstances is one type better than the other?   [8]

UNIT – II

Q.2 (a) In – connection with interprocess communication explain the following: [8]

    (i) Race Condition

    (ii) Critical Condition

    (iii) Sleep & Wake up

    (iv) Sleeping Barber's Problem

(b) Define scheduling criteria? Explain Quencing diagram for the CPU scheduling in detail? [8]

OR

Q.2 (a) Describe the difference between short term, medium term, & long term scheduling? [8]

(b) Consider the following set of processes, with the arrival times and the CPU burst times given in milliseconds. [8]

PROCESS	ARRIVAL TIME	BURST TIME
P1	0	5
P2	1	3
P3	2	3
P4	4	1

What is the average turn around time for these processes with the preemptive shortest remaining process time first algorithm?

UNIT – III

Q.3 (a) Explain Banker's Algorithm for deadlock avoidance with an example? [8]

(b) Apply deadlock detection algorithm to the following data & show the results: [8]

Available = (2, 1, 0, 0)

$$Request = \begin{pmatrix} 2 & 0 & 0 & 1 \\ 1 & 0 & 1 & 0 \\ 2 & 1 & 0 & 0 \end{pmatrix}$$

$$Allocation = \begin{pmatrix} 0 & 0 & 1 & 0 \\ 2 & 0 & 0 & 1 \\ 0 & 1 & 2 & 0 \end{pmatrix}$$

OR

Q.3 (a) With the help of neat diagram Explain Memory hierarchy in detail? [8]

(b) Explain the difference between Paging & Segmentation? [8]

UNIT – IV

Q.4 (a) Write Short note on Page Replacement Algorithms in Detail? [8]

(b) Let 620 frames are split between two processes, one of 100 pages & one of 1270 pages. Find the number of frames allocated for each process if proportional allocation method is used? [8]

OR

Q.4 (a) What is Belady's Anamoly? In which algorithm does it occur? [8]

(b) Consider the following segment table. [8]

SEGMENT	BASE	LENGTH
0	219	600
1	2300	14
2	90	100
3	1327	580
4	1952	96

Calculate the physical address for the following logical addresses?

UNIT – V

Q.5 (a) Define file system? Explain file operations in detail? [8]

(b) Explain the classification of Allocation Methods? [8]

OR

Q.5 (a) Explain the Concept of spooling with all its types and its advantages & disadvantages? [8]

(b) Suppose the head of moving head disk is currently servicing a request at track 60. If the queue of request is kept in FIFO order, what is the total head movement to satisfy these requests for the following disk scheduling algorithm: [8]

(i) FCFS

(ii) SSFT

REQUEST SEQUENCE	TRACK NUMBER
1	56
2	170
3	35
4	120
5	10
6	140

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UNIT-I

Q.1 (a) What is need of BIOS? Explain Boot strop loader also.   [8]

(b) Is there any difference between kernel level and user level threads? Justify your answer.   [8]

OR

Q.1 What are the benefits of threads? Explain context switching of processes and threads.   [16]

UNIT-II

Q.2 (a) What do you understand by semaphores? Can it be useful to solve reader – writer problem? Explain.   [8]

(b) What are different algorithmic solutions of critical section problem? Explain. [8]

Q.2 Compose FCFS, SJF and Round–Robin scheduling algorithms by computing average waiting time. There are 5 processes with CPU burst time as 10, 5, 17, 25, 6 and arrival times are 0, 1, 0, 2, 7 units. Assume time quantum for Round Robin scheduling as 5 units. [16]

UNIT-III

Q.3 (a) What are the different deadlock prevention schemes? Explain. [8]

(b) Compare best Fit, worst fit and first fit memory allocation schemes. The given jobs are of memory sizes 13KB, 5KB only. [8]

Address	Size of free space
005	2
070	28
105	12
279	82
395	15

Show the allocated addresses and free space table after every job for all 3 schemes.

OR

Q.3 (a) Write and explain Banker's algorithm for deadlock avoidance. [8]

(b) There are 2 jobs of sizes 25 and 12 to be allocated memory. The free space table is - [8]

Address	Size
005	02
009	17
210	89
383	13
490	11

Apply best fit, first fit and worst fit schemes and show allocated addresses and free space table after allocation.

UNIT-IV

Q.4 (a) Is there any difference between pure paging and demand paging? Explain. [8]

(b) Compute page fault ratio. The pages referenced are 7, 5, 2, 1, 7, 5, 4, 5, 1, 2, 5, and 7 (12pages). The job is allowed 3 blocks. Compare LRU & FIFO page replacement schemes. [8]

OR

Q.4 (a) Compute number of page faults for LRU, FIFO and optimal page replacement algorithms. The given page trace is 7, 5, 1, 2, 7, 4, 5, 4, 5, 4, 5, 7 (12 pages). The job is allowed 3blocks in primary memory. [8]

(b) What do you understand by Belady's Anomaly? Explain. [8]

UNIT-V

Q.5 (a) Explain various features of fill system of linux. [8]

(b) Compare FCFS and SSTF disk scheduling algorithms. Initially the Read/Write Head is at 50. The requests are. 63, 52, 01, 93, 72, 13, 81, 54, (8requests). Compute total movement of R/W Head. [8]

OR

Q.5 (a) Explain various file system features of windows operating system. [8]

(b) Compare SCAN and C – SCAN disk scheduling algorithms. Read write Head is at 45. The requests are 63, 52, 01, 93, 72, 13, 81, and 54 (8 requests). Compute total movement of R/W Head. [8]

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UNIT – I

Q. 1 (a)   What are the main functions of an operating system? Explain the types of operating systems in brief.   [8]

(b)   How an operating system works as a resource manager and vertical machine?   [8]

OR

(a)   What is a process? What is the difference between a program and a process? Explain PCB using a suitable example.   [8]

(b) Explain the following: -

    (i) Kernel level thread

    (ii) Boot strop loader

    (iii) System call

    (iv) Multithreading OS

UNIT-II

Q. 2 (a) What is critical section problem? Explain the role of lock variable and TSL instruction in busy waiting. [8]

(b) Consider the following set of processes with arrival time and CPU burst time given in ms.

Process	Arrival time	Burst time
P_1	0	8
P_2	1	4
P_3	2	9
P_4	3	5

What is the average waiting time for these processes with preemptive SJF scheduling? [8]

OR

(a) What is dining- philosophers problem? Explain the solution of this problem by using a suitable example. [8]

(b) What is the difference between preemptive and non-preemptive scheduling? [4]

(c) Explain the turnaround time and response time. [4]

UNIT-III

Q. 3 (a) Consider the following snapshot of the system-

Process	Allocation A	B	C	Max A	B	C	Available A	B	C
P_0	0	1	0	7	5	3	3	3	2
P_1	2	0	0	3	2	2			
P_2	3	0	2	9	0	2			
P_3	2	1	1	2	2	2			
P_4	0	0	2	4	3	3			

(handwritten) (a) Need Matrix

(handwritten) Need = Max$_i$ - Alloc

If a request from process P_1 arrives for (0, 1, 2) can the request be granted immediately? What is the content of need matrix? [8]

(b) What is deadlock? What are the necessary conditions to occur the deadlock? What are the various methods to recover from the deadlock? [8]

OR

(a) Explain free space management using bit map, linked list/ free list. [8]

(b) Explain the difference between logical and physical address space. Explain fragmentation. What are the various solutions for external fragmentation? [8]

UNIT-IV

Q. 4 (a) What is the difference between Pager and Swapper? [4]

(b) What is demand paging? [4]

(c) What is thrashing? [4]

(d) Write short note on TLB. [4]

OR

(a) Consider 3 page frames and the following reference string using FIFO page replacement algorithm to calculate the number of page faults in each reference string:- [10]

7 0 1 2 0 3 0 4 2 3 0 3 2 1 2 0 1 7 0 1

(b) What is virtual memory? Explain the use of virtual memory using a suitable example. [6]

UNIT-V

Q. 5 Suppose a disk drive has 200 cylinders, numbered from 0 to 199. The drive is initially at cylinder 53. The queue with request from 1/0 to blocks in cylinders: [16]

98   183   37   122   14   124   65   67

Count the total head movements of cylinders in -

(i)   SCAN Scheduling

(ii) C-SCAN Scheduling.

OR

Q. 5 Write short notes on:- [4×4=16]

(i)   Directory structure in Linux

(ii) File Naming

(iii) Acyclic graph

(iv) File organization