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Reg No.:_____   Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Fourth semester B.Tech examinations (S), September 2020

Course Code: CS204
Course Name: OPERATING SYSTEMS (CS)

Max. Marks: 100   Duration: 3 Hours

PART A
Answer all questions. Each carries 3 marks.

1	Write the differences between time sharing systems and multiprogramming systems.	3
2	What is the use of Process Control Block (PCB) in operating system?	3
3	How many times "Welcome" will be printed for the following code? void main() { fork(); fork(); fork(); printf ("Welcome\n");}	3
4	In a multiprocessor computer system bitmap is used for keeping track of the status 8 processors in the system. How many bits will be there in the bitmap? If processor0, processor3 and processor5 are currently allocated write the bitmap.	3

PART B
Answer any two questions. Each carries 9 marks.

5	a)	What do you understand by the layered structure of an Operating System? Point out its advantages and disadvantages.	5
	b)	How the long term scheduler directly affects the system performance?	4
6	a)	Write the operations taking place during the booting of a system.	4
	b)	In a message passing system how the send() / receive() operations and communication link is implemented in case of direct and indirect communication?	5
7	a)	Mention the purpose of system call. How the parameter passing takes place in system call.	5
	b)	What is process cooperation? What are the benefits of process cooperation?	4

PART C
Answer all questions. Each carries 3 marks.

8	What is meant by critical section? What is critical section problem?	3
9	Illustrate how semaphores can be used as a synchronisation mechanism?	3
10	What do you understand by starvation in operating systems? How starvation can be solved in priority scheduling?	3
11	Write the four situations under which CPU scheduling decisions take place.	3

PART D
Answer any two questions. Each carries 9 marks.

12 a) Give the solution for dining philosopher's problem using monitor.   6

   b) What are the three conditions to be satisfied to ensure solution to critical section problem?   3

13 a) What is the relevance of mutual exclusion to avoid race condition?   3

   b) Consider the following set of processes, with the length of the CPU burst time given in milliseconds.   6

Process	Burst time	Arrival time
P1	13	0
P2	9	2
P3	5	2
P4	7	3

i) Draw Gantt chart to show execution using pre-emptive SJF and Round Robin (time quantum=3) scheduling.
ii) Calculate average waiting time for each of the above scheduling algorithms.

14   Consider the following snapshot of a system with five processes P0,P1, P2, P3, P4 and four resources A,B,C and D   9

Process	Max	Allocation	Available
	A B C D	A B C D	A B C D
P0	0 2 1 0	0 1 1 0	1 5 2 0
P1	1 6 5 2	1 2 3 1	
P2	2 3 6 6	1 3 6 5	
P3	0 6 5 2	0 6 3 2	
P4	0 6 5 6	0 0 1 4	

Using Banker's algorithm, answer the following questions:-
i) How many instances of resources A, B, C, D are there?
ii) What is the content of Need matrix?
iii) Is the system in a safe state? If it is, find the safe sequence.

PART E

Answer any four questions. Each carries 10 marks.

15 a) Consider the following page reference string :   7
7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2, 1, 2, 0
Indicate page faults and calculate total number of page faults for FIFO algorithm, assuming that number of frames as three and four. Remember initially all the frames are empty. Check whether Belady's anomaly happens.

   b) Does paging suffer from fragmentation? Justify your answer.   3

16		Consider a simple paging system with 8KB page size and a page table with each entry of size 4 bytes. Answer the following questions.	10

16   Consider a simple paging system with 8KB page size and a page table with each   10
       entry of size 4 bytes. Answer the following questions.
       (i) How many bits are used for representing the page offset value?
       (ii) What is the size of the physical memory (in bytes) that can be addressed?
       (iii) Calculate the amount of internal fragmentation for a process of size 205KB.
       (iv) Is it possible to load a process of size 98KB if there are 12 free frames.
       Justify your answer.
       (v) How many frames are required for storing a process of size 331KB?

17   a)   Explain the terms (i) Dynamic Loading (ii) Dynamic Linking   4

    b)   Consider a fixed partitioned memory management scheme with fixed partitions   6
       are 150K, 300K, 550K, 400K, 250K and 200K (in order). Five processes are
       ready for execution each with memory requirement as P1(240K), P2(120K),
       P3(380K), P4(300K) and P5(350K). Write the allocation in each of the following
       cases and calculate the internal fragmentation and external fragmentation (if any)
       in each case.
       (i) First Fit   (ii) Best Fit

18   a)   What are the advantages of indexed allocation of file space?   4

    b)   Explain the techniques used for managing free space in disk.   6

19   a)   On a disk with 1000 cylinders numbered 0 to 999. Compute the number of tracks   6
       the disk arm must move to satisfy the entire request in the disk queue. Assume the
       last request was at track 350. The queue in FIFO order contains requests for the
       following tracks 240,750,630,530,500 and 360. Starting from the current position,
       what is the total distance (in cylinders) that the disk arm moves to satisfy all the
       pending requests for the following disk scheduling algorithms?
                  (i) SSTF   (ii) LOOK

    b)   Write short notes on protection domain.   4

20   a)   Differentiate physical formatting and logical formatting of a magnetic disk.   4

    b)   Explain any three techniques used for implementation of access matrix.   6