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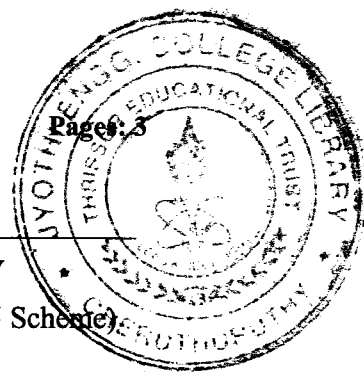
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Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Fourth Semester B.Tech Degree (S,FE) Examination August 2021 (2015 Scheme)



Course Code: CS204

Course Name: OPERATING SYSTEMS (CS)

Max. Marks: 100

Duration: 3 Hours

PART A

Answer all questions. Each carries 3 marks.

- | | | |
|---|--|---|
| 1 | What is the necessity of having various modes of execution in a system? | 3 |
| 2 | Which data structure is more suitable for representing the availability of large number of resources? Justify? | 3 |
| 3 | With figure explain how process is created using fork () system call? | 3 |
| 4 | Explain the different buffering mechanisms used in message passing systems? | 3 |

PART B

Answer any two questions. Each carries 9 marks.

- | | | |
|---|--|---|
| 5 | a) Explain the features of single processor, multiprocessor and multicore systems? | 6 |
| | b) With a figure explain the microkernel architecture? | 3 |
| 6 | a) With a neat diagram explain the different states of a process? | 6 |
| | b) <code>#include<stdio.h></code> | 3 |

`#include<unistd.h>`

`int main()`

`{ int i;`

`for (i=0; i<4; i++) fork();`

`return 0;`

`}`

Total how many processes will be created while running the above code? How many of them will be child processes?

- | | | |
|---|---|---|
| 7 | a) Illustrate the read and write operations using named pipe with example. | 5 |
| | b) What do you understand by system calls? List and explain the system calls used in process control. | 4 |

PART C

Answer all questions. Each carries 3 marks.

- | | | |
|---|---|---|
| 8 | What are the requirements for a solution to the critical section problem? | 3 |
|---|---|---|

- 9 Explain with an example the improper usage of semaphore causing deadlocks? 3
- 10 Define the parameters for multilevel feedback queue scheduling? How it is better compared to multilevel queue scheduling? 3
- 11 Explain with an example how wait for graph is used to detect deadlocks? 3

PART D

Answer any two questions. Each carries 9 marks.

- 12 a) Give a solution to the critical section problem using mutex locks? 3
- b) Explain Dining Philosophers Problem. Give a solution for the problem using monitors 6
- 13 Draw the Gantt chart and find Average waiting time and Average Turnaround time for the following algorithms using the data given in the table: 9
- (i) FCFS (ii) SJF (iii) SRTF

Process	Arrival Time(ms)	CPU Burst Time(ms)
P1	2	1
P2	1	5
P3	4	1
P4	0	6
P5	2	3

- 14 a) Consider the following snapshot of a system with five processes P1, P2, P3, P4, P5 and four resources A,B,C,D. Using Bankers Algorithm find the following 6
- (i) Calculate the Need Matrix.
- (ii) Is system is safe state? If yes find the safe sequence?
- (iii) If request from P2 arrives for (0, 3, 2, 0) can the request be immediately granted?

Process	Allocation				Max				Available			
	A	B	C	D	A	B	C	D	A	B	C	D
P1	0	0	1	2	0	0	1	2	1	5	2	0
P2	1	0	0	0	1	7	5	0				
P3	1	3	5	4	2	3	5	6				
P4	0	6	3	2	0	6	5	2				
P5	0	0	1	4	0	6	5	6				

- b) Differentiate counting semaphore and binary semaphore? 3

PART E

Answer any four questions. Each carries 10 marks.

- 15 a) Consider a logical address space of 64 pages with 1024 bytes per page mapped to a physical memory of 256 frames. 3

Find

- (i) Bits required for logical address
 - (ii) Bits required for physical address
- b) Consider 5 memory partitions of 100,275,450,300 and 650 Kilobytes. How would first fit, best fit and worst fit algorithm places processes of 225, 132, 420 and 450 Kilobytes in order. Find which algorithm make effective use of memory for this scenario? 7
- 16 Consider the reference string: 3 2 1 3 4 1 6 2 4 3 4 2 1 4 5 2 1 3 4. Assuming demand paging with 3 frames, how many page faults would occur for:- 10
- (i) FIFO replacement algorithm
 - (ii) Optimal replacement algorithm
 - (iii) LRU replacement algorithm
- What is the hit Ratio for the above algorithms?
- 17 a) Point out the difference between segmentation and paging. 6
- b) Consider page with size 1KB, find the page number and offset for the following logical address, in decimal. 4
- | | |
|------------|-----------|
| (i) 300 | (ii) 2000 |
| (iii) 1023 | (iv) 3560 |
- 18 a) With neat sketches illustrate the following disk space allocation algorithms 6
- (i) Linked allocation (ii) Indexed allocation?
- b) Differentiate sector sparing and sector slipping. 4
- 19 Suppose that a disk drive has 200 cylinders numbered from 0 to 199. The disk is currently servicing at cylinder 50. The queue of pending requests in FIFO order is 90,189,32,142,18,144,68 and 70. Starting from the current head position, what is the total distance(in cylinders) that the disk arm moves to satisfy all the pending requests for each of the scheduling algorithms? 10
- (i) FCFS (ii) SSTF (iii) SCAN
- 20 a) Describe protection domain with an example. 4
- b) Define Access Matrix. What are the operations associated with access matrix for transferring rights? Give examples. 6