Hall Ticket Number:

Code No. : 14245

VASAVI COLLEGE OF ENGINEERING *(AUTONOMOUS)*, HYDERABAD

Accredited by NAAC with A++ Grade

B.E. (C.S.E./AIML) IV-Semester Main & Backlog Examinations, July-2022

Operating Systems

Time: **3 hours** Max. Marks: **60**

*Note: Answer all questions from **Part-A** and any **FIVE** from **Part-B***

Part-A (10 × 2 = 20 Marks)

Q. No.	Stem of the question	M	L	CO	PO

1.	What is the state transition that occurs due to the scanf () system call in the program is given below?
	
	int main(){
	int a;
	scanf("%d \n ", &a);
	exit(0)
	}
		2	2	1	1,2

2.	Why is it important for the scheduler to distinguish I/O-bound programs from CPU-bound programs?	2	1	1	1,2
3.	Consider the following memory map using the partition model (Shaded - In use and White - Free). A new process, Pnew is of size 7k. Where Pnew is placed in Best Fit and Worst Fit techniques? 8k | 10k | 20k | 5k | 6k | 48k | 34k | 7k | 18k	2	3	2	1,2
4.	What is Belady's anomaly? Which algorithm suffers from this anomaly?	2	1	2	1,2
5.	Consider two process P1 and P2 such that always process P1 should execute first and then process P2. Design a solution using semaphores.	2	3	3	1,2
6.	A system is having 3 user processes each requiring 2 units of resource R. Find The minimum number of units of R such that no deadlock will occur.	2	3	3	1,2
7.	Find the average rotational latency of a device rotating at 600 RPM?	2	3	4	1,2
8.	Draw a diagram to show the implementation of I/O with DMA controller.	2	1	4	1,2
9.	List the key components of Linux operating system.	2	1	5	1,2
10.	What is the importance of Hardware Abstraction layer in Windows architecture?	2	1	5	1,2

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Part-B (5 × 8 = 40 Marks)

11. a)	Explain the following Operating system structure with neat sketches a) MS-DOS b) Micro-Kernel c) iOS	4	1	1	1,2
b)	Consider the set of 4 processes whose arrival time and burst time are given below	4	3	1	1,2

Process No.	Arrival Time	Burst Time		
		CPU Burst	I/O Burst	CPU Burst
P1	0	3	2	2
P2	0	2	4	1
P3	2	1	3	2
P4	5	2	2	1

If the CPU scheduling policy is Shortest Remaining Time First, calculate the average waiting time and turn-around time.

12. a)	How logical address is converted to physical address by using the following page table structures? a) Hierarchical b) Hashed c) Inverted	4	2	2	1,2
b)	i) If the total number of available frames is 50, and there are 2 processes one of 10 pages and the other of 5 pages, then how much of memory would be proportionally allocated to each of these processes? ii) Consider a logical address space of 64 pages of 1,024 words each, mapped onto a physical memory of 32 frames. a. How many bits are there in the logical address? b. How many bits are there in the physical address?	4	3	2	1,2
13. a)	Two processes, P1 and P2, need to access a critical section of code. Consider the following synchronization construct used by the processes:	4	2	3	1,2,3

```
/* P1 */                          /* P2 */
while (true) {                    while (true) {
  wants1 = true;                    wants2 = true;
  while (wants2 == true);           while (wants1==true);
  /* Critical                       /* Critical
     Section */                        Section */
  wants1=false;                     wants2 = false;
}                                 }
/* Remainder section */           /* Remainder section */
```

Here, wants1 and wants2 are shared variables, which are initialized to false. Does the construct satisfy Mutual Exclusion, Progress and Bounded Waiting? Justify your answer.

Contd... 3

b)	Consider the following snapshot of a system Allocation Max ABCD ABCD P0 3014 5117 P1 2210 3211 P2 3121 3321 P3 0510 4612 P4 4212 6325 Using the banker's algorithm, determine whether the system is in safe state or not? Available= (0,3,0,1)	4	3	3	1,2,3
14. a)	Suppose a disk has 201 cylinders, numbered from 0 to 200. At some time the disk arm is at cylinder 100, and there is a queue of disk access requests for cylinders 30, 85, 90, 100, 105, 110, 135 and 145. If Shortest-Seek Time First (SSTF) is being used for scheduling the disk access, the request for cylinder 90 is serviced after servicing how many number of requests?	4	3	4	1,2,3
b)	Explain the steps in I/O operation implementation with the help a flow diagram.	4	2	4	1,2,3
15. a)	What is the Access matrix? Explain the implementation of access matrix for protection implementation.	3	2	5	1,2,3
b)	Describe the algorithm used for process scheduling in Linux.	5	1	5	1,2,3
16. a)	Describe the role of Schedulers in process execution and show the same in the process transition diagram.	4	2	1	1,2,3
b)	Explain the significance of TLB in Page Table implementation. If the hit ratio to a TLB is 80%, and it takes 15 nanoseconds to search the TLB, and 150 nanoseconds to access the main memory, then what must be the effective memory access time in nanoseconds?	4	3	2	1,2,3
17.	Answer any ***two*** of the following:				
a)	Design a solution for Readers-Writers problem by using Monitors.	4	2	3	1,2,3
b)	Explain the issues in Disk Management.	4	2	4	1,2,3
c)	Describe the life cycle of an Activity and a Service in the Android operating system.	4	2	5	1,2,3

M : Marks; L: Bloom's Taxonomy Level; CO; Course Outcome; PO: Programme Outcome

i)	Blooms Taxonomy Level – 1	20%
ii)	Blooms Taxonomy Level – 2	32%
iii)	Blooms Taxonomy Level – 3 & 4	48%

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