



School of Computer Science and Engineering

Fall Semester 2024-25

CAT I

SLOT: F1

Programme Name & Branch: B.Tech. Computer Science and Engineering and Business systems (in collaboration with TCS)

Course Name & Code: Principles of Operating Systems & CBS1006

Class Number (s): VL2024250103938 / VL2024250103940

Faculty Name (s): Dr Geraldine Bessie Amali / Dr Padmavathy T

Exam Duration: 90 Min.

Maximum Marks: 50

General instruction(s):

Answer all the questions.

Q. No.	Question	Max Marks
1.	Suggest a method with a neat architecture diagram to overcome the overhead associated with the Microkernel approach of designing the OS.	06
	List some of the essential services that an operating system must provide to effectively support mobile applications like "WhatsApp".	04
2.	a) Categorize the following instructions into privileged instructions and non-privileged instructions. Also mention whether the instruction to be executed under user mode or kernel mode. i) Reading system time ii) Clear Memory iii) Opening and reading a file iv) Set the timer v) Performing arithmetic operation	05
	b) What is a System call? Identify the methods through which the parameters are passed to the Operating System in handling a system call.	05
3.	a) Elaborate on the system calls for process creation, termination and wait in Linux operating system with suitable program. Also, explain about the orphan process.	06
	b) For the give program in execution, construct the Process Control Block. struct node { int res; } int main() { int a, b; a=10,b=20;	04

	<pre>struct node *p; p=(struct node*) malloc(sizeof(struct node*)); p->res=a+b; printf("Result=:%d",p->res; return 0; }</pre>																													
4.	a) How is symmetrical processing achieved in multi-processor scheduling? Also, list the shortcomings of symmetrical multiprocessor scheduling with ways to overcome the shortcomings?	05																												
	b) Consider two processes, P1 and P2, where p1 = 50, t1 = 25, p2 = 75, and t2 = 30. Illustrate the scheduling of these two processes using earliest deadline-first (EDF) scheduling. (The deadline is considered as beginning of the next period and depict the schedule for 3 cycles)	05																												
5.	a) The following processes are being scheduled using a preemptive Round Robin Scheduling algorithm. Each process is assigned a numerical priority, with a higher number indicating a higher relative priority. In addition to the processes listed below, the system also has an idle task (which consumes no CPU resources and is identified as P _{idle}). This task has priority 0 and is scheduled whenever the system has no other available processes to run. The length of a time quantum is 12 units. If a process is pre-empted by a higher-priority process, the pre-empted process is placed at the end of the queue. <table><tr><th>Thread</th><th>Priority</th><th>Burst</th><th>Arrival</th></tr><tr><td>P₁</td><td>10</td><td>20</td><td>0</td></tr><tr><td>P₂</td><td>7</td><td>24</td><td>23</td></tr><tr><td>P₃</td><td>7</td><td>18</td><td>32</td></tr><tr><td>P₄</td><td>9</td><td>10</td><td>70</td></tr><tr><td>P₅</td><td>2</td><td>14</td><td>72</td></tr><tr><td>P₆</td><td>5</td><td>10</td><td>74</td></tr></table> A. Show the scheduling order of the processes using a Gantt chart. B. What is the turnaround time for each process? C. What is the waiting time for each process? D. What is the CPU utilization rate?	Thread	Priority	Burst	Arrival	P ₁	10	20	0	P ₂	7	24	23	P ₃	7	18	32	P ₄	9	10	70	P ₅	2	14	72	P ₆	5	10	74	06
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	b) For the Processes listed in 5a) , Give the Shortest Job First scheduling A. Show the scheduling order of the processes using a Gantt chart. B. What is the turnaround time for each process? C. What is the waiting time for each process? D. What is the CPU utilization rate?	04																												