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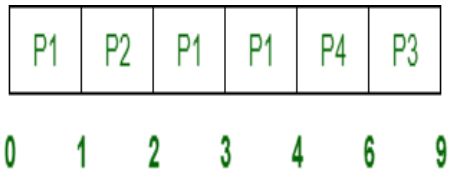
KONGU ENGINEERING COLLEGE, PERUNDURAI 638 060

CONTINUOUS ASSESSMENT TEST 1

(Regulations 2020)

Month and Year : September 2023	Roll Number:
Programme : B.Tech Branch: Information Technology Semester : V	Date : Time :
Course Code : 20ITT52 Course Name : Operating Systems	Duration : 1 ½ Hours Max. Marks : 50

	PART - A (10 × 2 = 20 Marks) ANSWER ALL THE QUESTIONS		
1.	n - fork statements will create 2^n - 1 childs. ∴ 5 fork statements will create 2^5 - 1 = 31 childs.	[CO1]	[K1]
2.	▪ Dual-mode operation allows OS to protect itself and other system components ▪ User mode and kernel mode[(also called as supervisor mode, system mode, or privileged mode). Mode bit provided by hardware ▪ Provides ability to distinguish when system is running user code or kernel code. ▪ When a user is running ➔ mode bit is "user" [No direct access to memory, h/w] ▪ When kernel code is executing ➔ mode bit is "kernel" ▪ System call changes mode to kernel mode, return from call resets it to user mode	[CO1]	[K1]
3.	Process Management, Memory Management, File-system Management, Mass-Storage Management, Cache Management, I/O Subsystem	[CO1]	[K1]
4.	**Various ways to structure OS are** • Simple structure – MS-DOS • Monolithic Structure – UNIX • Monolithic plus modular design – Linux • Layered – an abstraction • Microkernel – Mach	[CO1]	[K2]
5.	Distinguish between client-server and peer-to-peer computing.	[CO1]	[K2]
6.	**Real-time OS has well-defined fixed time constraints** • Processing ***must*** be done within constraint • Correct operation execute , only if constraints met	[CO1]	[K1]
7.	Irrespective of n	[CO1]	[K2]
8.	**FCFS:P1,P2,P3 RR2:P3,P1,P2**	[CO2]	[K2]
9.	**Average waiting time:** Z = 2, then Gantt chart will be = {(4-0-3) + (2-1-1) + (9-3-3) + (6-4-2)} / 4 = (1 + 0 + 3 + 0) / 4 = 4 / 4 = 1 	[CO2]	[K1]
10.	Caches are useful when two or more components need to exchange data, and the components perform transfers at differing speeds. Caches solve the transfer problem by providing a buffer of intermediate speed between the components. If the fast device finds the data it needs in the cache, it need not wait for the slower device.	[CO1]	[K1]
	Part – B (4 × 10 = 30 Marks) ANSWER ANY FOUR QUESTIONS		
11.	**Operating System Services** Operating systems provide an environment for execution of programs and services to programs and users	[CO1]	[K2]

	1. One set of operating-system services provides functions that are helpful to the user: • **User interface** - Almost all operating systems have a user interface (**UI**). ▸ Varies between **Command-Line Interface** (**CLI**), **Graphics User Interface** (**GUI**), **touch-screen** • **Program execution** - The system must be able to load a program into memory and to run that program, end execution, either normally or abnormally (indicating error) • **I/O operations** - A running program may require I/O, which may involve a file or an I/O device • **File-system manipulation** - Programs need to read and write files and directories, create and delete them, search them, list file Information, permission management. • **Communications –** Processes may exchange information, on the same computer or between computers over a network. Communications may be via shared memory or through message passing (packets moved by the OS) • **Error detection –** OS needs to be constantly aware of possible errors. May occur in the CPU and memory hardware, in I/O devices, in user program. For each type of error, OS should take the appropriate action to ensure correct and consistent computing [ex- paper out in printer]. Debugging facilities can greatly enhance the user's and programmer's abilities to efficiently use the system **2. Another set of OS functions exists for ensuring the efficient operation of the system itself via resource sharing** • **Resource allocation** - When multiple users or multiple jobs running concurrently, resources must be allocated to each of them ▸ Many types of resources - CPU cycles, main memory, file storage, I/O devices. • **Logging** - To keep track of which users use how much and what kinds of computer resources • **Protection and security** - The owners of information stored in a multiuser or networked computer system may want to control use of that information, concurrent processes should not interfere with each other ▸ **Protection** involves ensuring that all access to system resources is controlled ▸ **Security** of the system from outsiders requires user authentication, extends to defending external I/O devices from invalid access attempts		
12.	**Types of System Calls** ▪ **Process control** • create process, terminate process • end, abort • load, execute • get process attributes, set process attributes • wait for time • wait event, signal event • allocate and free memory • Dump memory if error • **Debugger** for determining **bugs, single step** execution • **Locks** for managing access to shared data between processes	[CO1]	[K2]

- **File management**
  - create file, delete file
  - open, close file
  - read, write, reposition
  - get and set file attributes
- **Device management**
  - request device, release device
  - read, write, reposition
  - get device attributes, set device attributes
  - logically attach or detach devices
- **Information maintenance**
  - get time or date, set time or date
  - get system data, set system data
  - get and set process, file, or device attributes
- **Communications**
  - create, delete communication connection
  - send, receive messages
    - From **client** to **server**
  - **Shared-memory model** create and gain access to memory regions
  - transfer status information
  - attach and detach remote devices
- **Protection**

Control access to resources
Get and set permissions
Allow and deny user access

13. **i. Gannt Chart:** [CO2] [K3]

a. FCFS Scheduling

P1	P2	P3	P4	P5
0	11	14	25	27 36

b. SJF Scheduling

P2	P4	P3	P5	P1
0 3	7	16	25	36

c. SRTF Scheduling

P2	P4	P3	P5	P1
0 3	7	16	25	36

d. Pre-emptive Priority

P1	P5	P4	P3	P4	P5	P1	P2
0 1	2	5	14	15	23	33	36

e. Round Robin(Quantum =3)

P1	P2	P3	P4	P5	P1	P3	P4	P5	P1	P3	P5	P4
3	6	9	12	15	18	21	22	25	28	31	34	36

ii. Turnaround Time

	FCFS	SJF	SRTF	Preemptive Priority	Round Robin
P1	11	36	36	33	36
P2	14	3	3	36	6
P3	18	11	11	9	26
P4	25	5	5	13	20
P5	35	24	24	22	33
Average	**20.6**	**15.8**	**15.8**	**22.6**	**24.2**

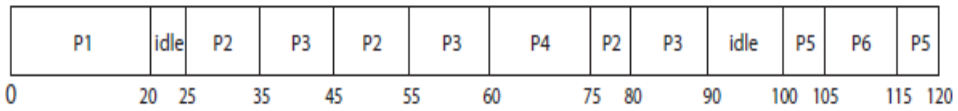
Waiting Time

	FCFS	SJF	SRTF	Preemptive Priority	Round Robin
P1	0	25	25	22	25
P2	11	0	0	33	3
P3	9	2	2	0	17
P4	21	1	1	9	16
P5	26	15	15	13	24
Average	**13.4**	**8.6**	**8.6**	**15.4**	**17**

iii. SRF or SRTF scheduling algorithm results in minimal average waiting time
iv. SRF or SRTF scheduling algorithm results in minimal turnaround time

14. [CO2] [K3]

a. The Gantt chart:



b. P1: 20-0 = 20, P2: 80-25 = 55, P3: 90 - 30 = 60, P4: 75-60 = 15,
P5: 120-100 = 20, P6: 115-105 = 10[finishing time minus arrival time]
c. P1: 20-20 =0, P2: 55-25 =30, P3: 60-25 =35, P4: 15-15=0,
P5: 20-10 =10, P6:10-10 = 0 [turnaround time minus burst time]
d. P1: =0, P2: 25-25 =0, P3: 35-30 =5, P4: 60-60=0,
P5: 100-100 =0, P6:105-105 = 0 [Time it started Executing – arrival Time]
e. CPU utilization = CPU used time/ Total time = 105/120 = 87.5%

Bloom's Taxonomy Level	Remembering (K1)	Understanding (K2)	Applying (K3)	Analysing (K4)	Evaluating (K5)	Creating (K6)
Percentage	20	47	33	-	-	-