D D	M M	Y Y Y Y
1 2	0 1	2 0 2 4

Test - 1

1 a) Operating system is an intermediate between the user and the hardware of the computer

G U I	Commands

| User interference | I/O operations | File management |
| Communication | Error checking | program execution |

| Other services | |
| Protection and security | Allocation |

Types of O
Services of operating system

→ User interface :-
For an operating system to run, primary requirement is User interface. User interface helps in execution of programs.

→ I/O operations:-
Input output operations can be done using operating system. To user can input a certain values to operating system and expect for output.
The output is executed by the program.
OS supports in output operation.

→ Program execution

Using certain applications, O.S supports for program execution. Programs can be executed when there is an input file uploaded.

→ Communication

Operating system helps in sending and receiving a message. It also sends message about the current status.

→ File management

Operating system helps in opening and closing file. It also helps in reading and writing of a file

→ Error detection

There can be many errors in a program, but operating system helps in detecting the errors and correcting it

→ Other services

→ Protection and security

Operating system helps in protecting the device from any malware or loosing data

1b)   Multi processor

             clustered system.

2a)   Virtual machine helps

2b)   System calls is an intermediate b/w input of a
file to aborting/ending a file

1b)

Multi processor	clustered system
→ 2 or more processor is combined to form a multi processor	Many systems which are connected through a network is called clustered system
→ Assymetric multiprocessor is a lord/slave processor in which the main processor gives instruction to the device for performing tasks	Assymetric clustered system is a hot/STAND system where the main clustered system does nothing but supervises the other system, when the absence system is there, main system does the work
→ Symmetric multiprocessor is where both 2 processor and device do the same work	Symmetric clustered system where both the networks do the same work, when one is shut the other takes the place.
→ More reliable, compared to clustered system	less reliable compared to multiprocessor
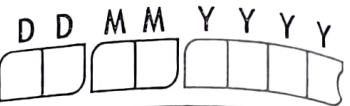
b ii)

| Multi programming	Multi tasking
→ Only one CPU is utilized	Multiple tasks are utilized for multi tasking
→ They are ~~at stages~~ expensive	They are time sharing as well
→ They are less reliable	They are more reliable
→ Due to people organisation many programs can run at same time	Many tasks can run at once.
→	
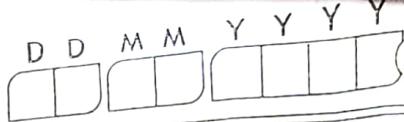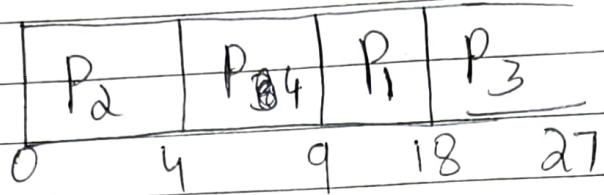
4 a)

Process	Arrival time	Burst time	Priority
P1	0	9	3
P2	1	4	2
P3	2	9	1
P4	3	5	4

i) FCFS

P$_2$	P$_{04}$	P$_1$	P$_3$

0   4   9   18   27
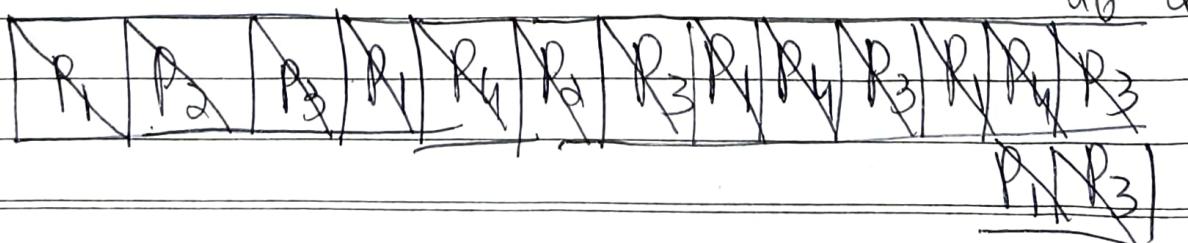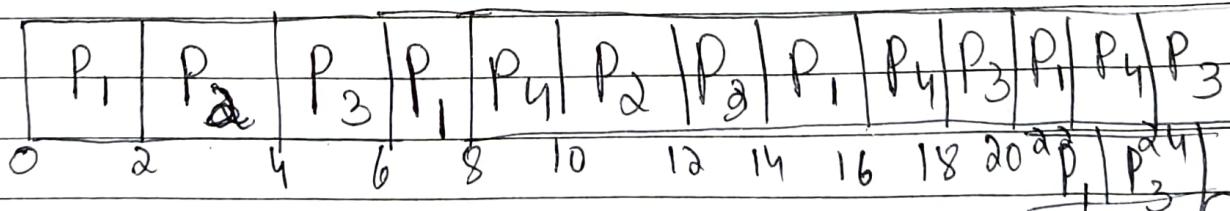
Process	WT	TAT
P$_1$	9	18
P$_2$	0	4
P$_3$	18	27
P$_4$	4	9

$$\sum WT = \frac{31}{4} = 7.75$$

$$\sum TAT = \frac{55}{4} = 13.75$$

ii) RR (q = 2 ms)

P$_1$	P$_2$	P$_3$	P$_1$	P$_4$	P$_2$	P$_3$	P$_1$	P$_4$	P$_3$	P$_1$	P$_4$	P$_3$

0   2   4   6   8   10   12   14   16   18   20   22

P$_1$	P$_3$

26   28

P$_1$	P$_2$	P$_3$	P$_1$	P$_4$	P$_2$	P$_3$	P$_1$	P$_4$	P$_3$	P$_1$	P$_4$	P$_3$

P$_1$	P$_3$

priority

P₁	0	3
P₂	1	2
P₃	2	1 - 1
P₄	3	4

P3
0   1

Round robin

	CT	TAT	WT
P₁	26	26	26
P₂	12	11	10
P₃	28	10	8
P₄	24	19	16

$$\Sigma TAT = \boxed{16.5}$$

process	Threads
→ Heavy weighted process	Light weight threading
→ Multiprocessing needs OS interference	Multithreading don't need OS interference
→ During a process, same program is executed but different file resources	All threads are executed at same time

Quiz

1) a) fork

2) a) when process is scheduled to run after conal execution

3) b) communication b/w processes

4) b) program counter

5) b) 5