

Educate Elevate Enlighten

JSS Mahavidyapeetha  
**JSS Science And Technology University**  
(Established Under JSS Science and Technology University Act No. 43 of 2013)  
(Formerly Known as SJCE)



**IV SEMESTER B.E DEGREE - CIE-3/TEST-3 (Section - 'A', 'B', 'C')**

**Branch:** Computer Science and  
Engineering

**Name of the Paper Setter:** Prof Sheela N & Prof. Vani Ashok  
**CS450 - OPERATING SYSTEMS**

**Duration:** 01 Hr. (2:30am to 3:30 P.M)

**Date:** 16/06/2021

**STUDENT NAME:**

**Max. Marks:** 20

**Day:** Wednesday

**USN/SR. No:**

**COURSE OUTCOMES**

After **completing** this course, **students** should be  
able to:

Understand various activities of process, thread, memory, **file** and secondary storage components  
of an Operating System.

CO1:

CO2:

Apply various **scheduling** algorithm of process, **memory** and secondary storage  
components.

CO3:

CO4:

Analyze the concepts of **inter process** communication, deadlocks, memory  
allocation strategies, page replacement algorithms of OS.

Evaluate various algorithms for handling processes, **threads**, memory allocation strategies and deadlocks.

NOTE: Answer any two questions:

Q No co

CD

Questions.

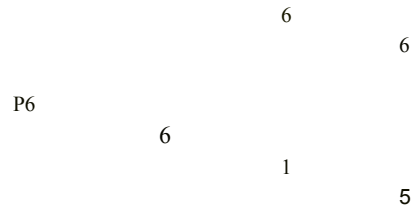
1.

CO2 Appli  
cation

Consider the following set of processes, with the length of the CPU burst time and arrival time given in milliseconds.

10

Process ID	Arrival Priority Burst	
	Time	Time
P1	1	
P2	4	
P3	3	
P4	4	
	3	8
	4	2
	5	4
	4	1
P5	10	



Draw **the** Gantt Charts to illustrate the execution of these processes using **the** following scheduling algorithms:

- i) Preemptive SJF
- ii) Non preemptive Priority
- iii) Preemptive Priority
- iv) Round Robin with Time Quantum = 3 ms

Compute the average Turnaround time, average Waiting time and average

Response time of these scheduling algorithms.

Which algorithms results in minimum average waiting time.

What is **the** percentage utilization of CPU?

Scanned with CamScanner

Marks

2.

CO3 Analy Consider the implementation of a lock using atomic hardware instructions. If the

lock is defined using the following structure

```
typedef struct
```

```
int available;
```

```
} lock;
```

available 0 indicates that the lock is available and available=1 indicates that the **lock is unavailable**. Using this structure, modify the test\_and\_set() and swap() instructions to acquire and release lock along with the mutual exclusion implementation of critical

section problem.

Include any initialization that may be necessary.

3.

**C02 Appli** Consider the following snapshot of a system:

cation

Process Id	Allocation	Max
	A B C D	A B C D
P0	2001	4212
P1	3121	5252
P2	2103	2316
P3	1312	1424
P4	432	3665

1

4

Using banker's algorithm, determine whether or not each of the following **states is unsafe**. If the state is safe, illustrate the order in which the processes may complete. Otherwise illustrate why the state is unsafe.

i) Available = ( 3, 3, 2, 1)

ii) Available = (0, 3, 0, 1)

For the above shown snapshot, determine whether the following requests with the Available=(3, 3, 2, 1) can be granted immediately. If so, find the safe sequence, otherwise illustrate why request can't be granted.

- i) Request from P1 arrives for ( 1, 1, 0, 0)
- ii) Request from P4 arrives for (0, 0, 2, 0)



AT

BT

TT

P

8

P2

<sup>3</sup>  
M

6

2

7423

Pre-emptive

SJF

21-1=20

WT

20-8=12-

3-2=1

RT

0

J

10-3=7

ホーム=3

5-6=1

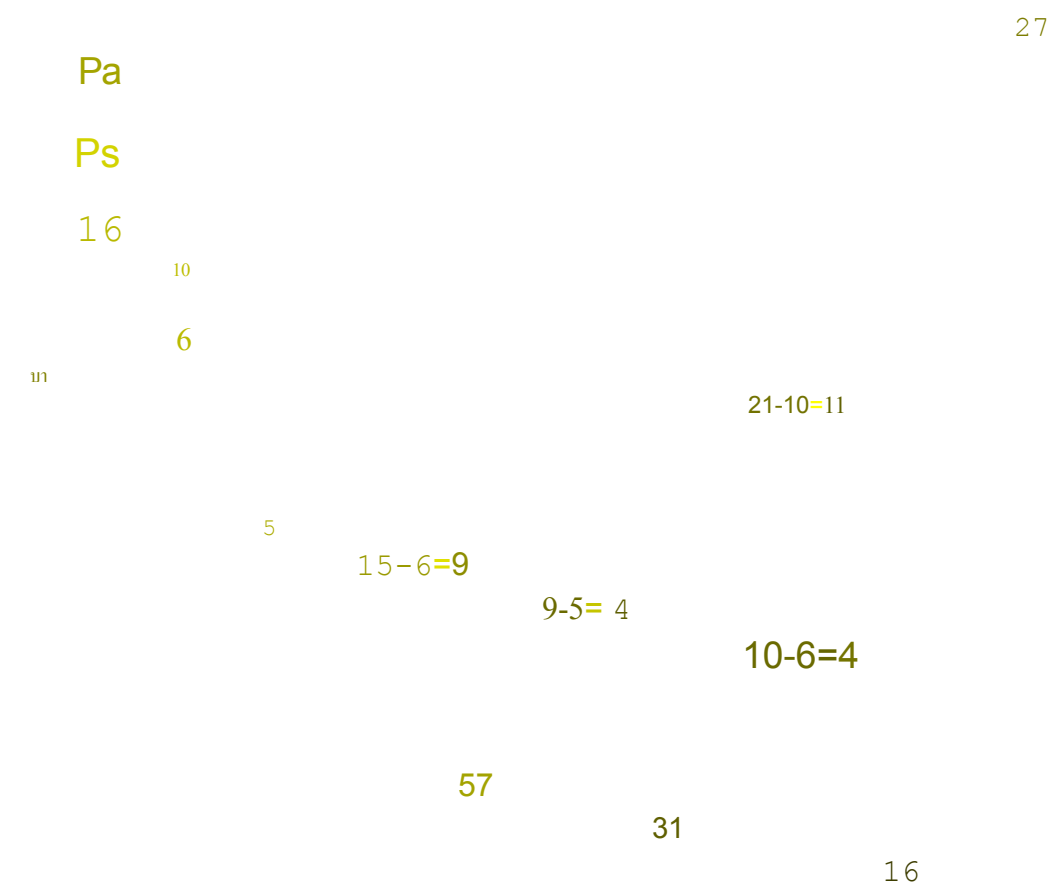
0

27-10-17 17-6 = 1}

5-4=1

3-3=0

4-4=0



Pre-emptive

SSF

(6)

ابى

P1 (2) P2 ( ) | P4 (4) | P2 (2) P3  
(2) P6 (5) P1 (6). Ps. (6)





$$\text{Avg. } WT = 57 / 6 = 9.5$$

$$\cdot \text{Arg } WT =$$

$$\text{Avg } RT$$

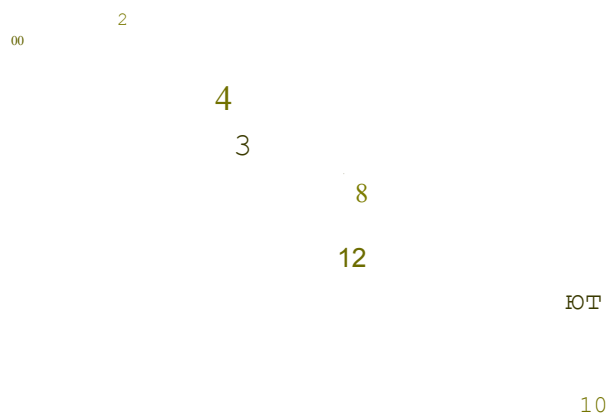
$$31 / 6 = 5.16$$

$$1616$$

$$= 2066$$

## Nox-preemptive priority

12 2  
AT BT Priority TT



PT

$$1-1=0$$

$$14-4=10$$

$$21-3=18$$

$$14$$

$$17-3=14$$

$$5$$

$$17-4=13$$

$$12$$

$$16-4=12$$

$$10$$

$$6$$

$$2710=17$$

$$11$$

$$21-10=11$$

P2

$$6$$

$$5 @$$

$$14-6=8$$

$$3$$

$$9-6=3$$

$$76$$

$$50$$

So

P1 (E) P6 (5) P2 (2) Pq  
(1) P3 (4) P5 (6)

9

$$TT = 76/6$$

WT 2

14

16

17

21

$$=12.66 \quad TT=75/6 \quad 50r$$

$$58.3 / 0P) \quad WT =$$

$$45/6 = 8-16$$

$$TT: 75/6=12.5$$

$$27=50/6=8.3$$

$$PT =$$

$$49/6=8-16$$

OT

27

# Preamplive priority

AT & T Privity  
TT

		WT	RT
h	3	14-1 = 13	5
			0
业		16-4=12	10
			14-4=10
		21-3=18	14
			17-3=14
	4	17-4=13	12
			16-4=12
		27-10=17	11
			21-10=11
		11-6=5	

1  
 4  
 6  
 10  
 ВЫБ  
 3

Zale) P1 (5)  
 | P6 (5)

| P, (3) B2 (2 .) Pq (1)  
 P2 (4) Ps (6)

21  
 6-6=0

78

52

47

$T_T = 78/6 = 13 \text{ ms}$

$WTE \ 57/6 = 8 + 67$

PT =

$$27/6=7.83$$

RR (3ms)

BTCTTT

!)

14

16

17

$$77/6=12.83$$

op

$$51/6=8.5$$

$$46/6=7.6$$

27

AT BT

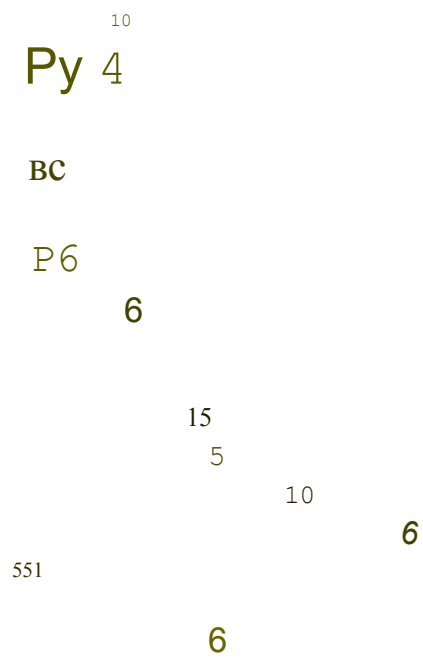
WT RT

Pi

8

22

21



$$TT = 81$$

6

$$NT =$$

$$55/6 = 9016$$

$$RT = 23/6 = 3.833$$

13.5

27

17

H

24

18

13

#

81

55

23

(1)

(2)

(27

P,

PzP2 P4

P

*Bb*

Pz

P5

(3)

Pi Po Ps

b 19

10

13



Ready Q

B3 Pr Pu Pr PG P3 Ps Pi PG PG

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int Test-and-set (lack of  
target)

9

int PV = Target-> available;

Target available = '1'

return RV;

ME

Implementation.

مله

< while (Test-and-set (slock)); //

# do nothing

```

    c/s
    lock → available = 0;
    { while (true)
int swap (lock Valve, int x6)
    &
    ( int temp = value available;
    ->
    Value; available = *b;
    +6 = temp;
    柏
    i
do <
    int key = 1;
    while (key ==
    1)
        Swap (xlack, key) ; // do
        nothing
        4 / 5
        lock -> available = 0;
        RIS
    } while
```

(true) ;

Scanned with CamScanner

Allocation Max

Available Need

ARC D

A B C D

A B C D

A B C D

*l*

2 0 01

3

2

P3|1

Pa

1 4

2

? 2-

9

69

M  
M

12

4212

5252  
 2316  
 14  
 3665  
 3321  
 22  
 11  
 5322  
 2131  
 213  
 2  
 4  
 6634  
 0  
 12  
 710 66  
 2  
 233

Allocated 49, 9, 6, 9

> = (1, 13, C, DS

Available <3 3 2 17

Total = [12, 12, 8, 10]>=

(A,B,C, D)

(f) d= Po need &

work

Need = Max -  
Allocation

(2,2,1)) { (3,3,2,1) \_ executes  
releases,

に

Work = Available = (3,3, 2, 1) +

(2,0,0,1) = (5, 3, 2, 2)

£=

P),

PI

(2, 1, 3, 1)

\$ (5, 3, 3, 2)

3, 1)

(5,3,3

X

= P2 (0, 2, 1, 3) \$ (5, 3, 2,

2) X

J =

P2

x = 14

z

3.

32 2

<0, 1, 1, 2>

<(5, 3,

Work :

5, 3, 2, 2

+

6, 6, 34

1, 3, 1, 2

(2, 4, 3, 3) ≤

(6, 6, 3, 4)~

2

4, 3,

2)

work = (6, 6, 3, 4) +

(4, 3,

= 29, 10, 6,

67

B

j = P, (2, 1, 3,

1) ) { (7, 10, 5,

6) ~

work = (\$, 10, 6, 6) +

(3, 1, 2, 1)~

$$++ P + (0, 1, 1, 3) \leq (10, 11, 8, 7)$$

Sobe sequence is

$$P_0, P_s, lq, P_1, P_2$$

$$\begin{aligned} \text{work } (10, 11, 8, 7) + \\ (2, 1; 0, 3) \\ = (12, 12, 8, 10) \end{aligned}$$

Scanned with CamScanner

(ii)

$$(1) \text{ Amilable } = (0, 3, 0, 1)$$

$P_{ox}$

$P$

$$P_0 \times ; ; P, X,$$

$$P_2 \times,$$

$$P_{yx}, P_{ax}$$



Need

of

Po

sse > Available

337

X

A B C D

C D

Po 20

01

4

21

2-

Request prom PI arrives for (1,1,0,0)

Allocation

pom

Max Ab

Need

A B C D

221

Available A B C

D

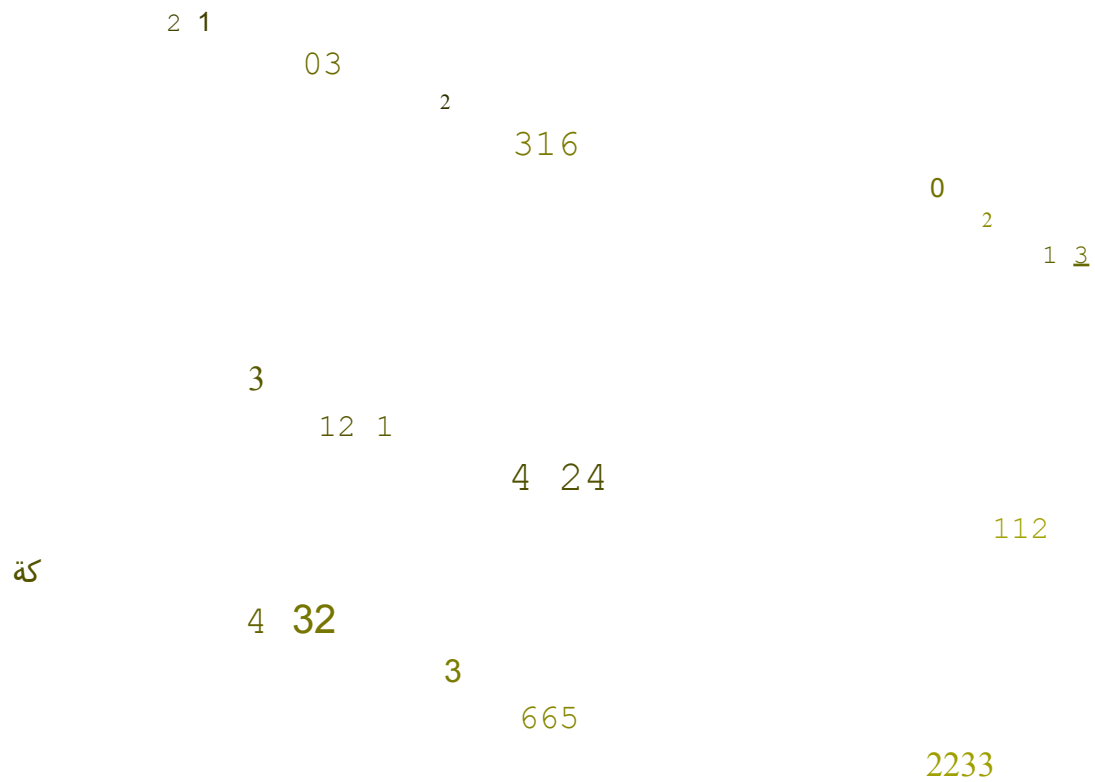
12 221

P, 14 2 21

5252

03

P



work- available = <2, 2, 2, 1)

Po) (2211) ≤

(2

work = 12

ε

221

1) + (2001) = (4,  
2, 2, 2}

2 2

1/

$$P1 \quad (10, \cdot, 3, 1) =$$

$$(4, 2, 2, 2) \times$$

B

$\downarrow$

$$3 <$$

$$P2 \quad (0, 4, 17) \leq (4, 322$$

$$/ \times$$

b.

$$P3 \quad (0, 1, 1, 2) \{ (4,$$

$$3, 2, 4) \blacktriangleright$$

B3

$$\text{work} = (4, 2, 2, 2) + (1, 3,$$

$$1, 2) - (5, 5, 3, 4) \quad P4 \quad (3, 2, 3,$$

$$3) \leq (5, 5, 341-$$

2

$$\text{work} = (5, 5, 3, 4) + (1,$$

$$4, 3, 2) = (6, 9, 6, 6)$$

$$P1 = (1, 0, 3, 1) = (6, 9, 6,$$

6) ►

work = (6, 9, 6, 6) + (4, 2, 2, 1)

= 19, 11, 8, 7 P2 = (0, 2, 1,

3) { (10, 11, 8, 7) ►

(5)

p

Wirk = 12, 12, 8, 10 (P0, P3,  
P4, P1, P2>

=>

Scanned with CamScanner

2

from Pu arrives  
10,0,2,0)

3

Request from

Mlocation

Mak

10

Available

3 3 3 2

Need

A, B, C, D ABCD X, B,  
C, D

1,4,5,2 3 6,6,5 3 3 0 1

A B C D

2 2 1 3

Since resource  
type

I is zero, none of the processes  
can execute as they all need II c  
type resource

ie., Need; > Available

1.5/m is unlafl

		1	2	3	Total
SLN	NAME	(10M)	(10M)	(10M)	(20M)
1	Manoj kumar	5	5		10

2	Suraj G S				
	Tanmai M G	10	u		
				14	
4	Abhilash M Hadli	10			
				18	
5	Adithi Mallesh	10	5		
			7		
				17	
6	Alaap Surendran	10			
			q		
				19	
7	Ananya K	10			
			5		
				15	
9	Apoorva KC	10			
			5		
				15.	
10	Ashutosh A Dodamani	119			
			5		
11	CHANDAN HY				
			Q		
				18	
12	CHANDAN V	10			
			5		
				15	

13	Chandana Raju	5	10	16
14	Chatush S	10	S	
15	Chethan S	10	5	Q 717 6007 19
16	Chinmay jd	10	5	15
17	Chittesh Khachroo	10	5	15
18	D anushruta	10	6	16
19	Darshan M	10	516	16
20	Devothama GN	09	5	10 19
21	Dheemanth R			



		10	5	15	
22	Dixith SR	10	5	15	
23	Jayesh Jain	10	5	15	
24	Kashyap S	10	5	6	16
25	Kishan MM	10	5	9	19
26	Mahith R	10	5	6	16
27	Mahmadarshad	10	5	17	17
28	Mohammed Ezhan	10	5	6	16
29	Nikhil m Raj	10	5	15	

east

30 Nireksha Kothwal

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S

31  
Niteesh Bhat

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S

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76

32 Prajwall

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Raksha BR

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ROHAN.D

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35  
Rohith HN

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5

36 Sachin BR

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37  
Sahana

39  
Samarth Prasad

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|||||

1

					19
		10			
			5		16
40	Shailendra kumar				
41	Shaman B H	8		6	14
42	Shanmukhappa SD	15	5	\$	18
43	Shashidhar S Joshi	10	5		15
		10	5		15
44	Shobhith k				
45	Shreyas Suri	10	5		15
		10	5		15
46	Sinchana M P		5	9	14
47	Sinchana RG		5		
				10	15
48	SMITHA BHAT M				

(rom) (10M)  
(10M)

		1	2	Tot
49	Sneha John	10	?	18
50	Soundarya Rd	10	5	
51	Sreelal Raj mk	10	5	
52	Srinivas Reddy			
54	Sriram N	10		
55	Srushti C	0		
ज	ज		7	17

				平	17
				P	19
					15
					15
56	Srushti Krishnagiri			9	10
57	Stuti Srinath	10	5		15
58	Subrahmanya Ramachandra naik	10	5	8	18
59	Sudeep H S	8	5		14
60	Sujith D	10	5		19
61					

	Supriya L		5	7	
62	Surabhi A	10	5		15
63	Surabhi Seenivasan		5		12
64	Tejaswini M		5	8	17
65	Thanmay Jain S P			10.	If
66	Varun.M	6			
67	Vivek.E		6		12-
68	Yashwanth prasad BL	10		5	
			10	5	

69 Deepak S

4

3

5

70

Mohamaadjuber

**71 Mamatha H L**

10

5

55145

2

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6

12-

72 Niranjan S

6

10

16

73

Nishitha S

5

12-

74

Sinchana C

75 Thejaswini K<sub>R</sub>

10

