



PH

SAVITRIBAI PHULE PUNE UNIVERSITY

**Instruction to Candidate**

1. Candidate has to confirm seat number, subject and centre number printed on Bar code and Write it on attendance sheet.

विद्यार्थ्यांने प्रथम बार कोडवरील आसन क्रमांक, विषय व केंद्र क्रमांक तपासून योग्य असल्याची खात्री करावी आणि उपस्थिती पत्रकावर नोंदवावी.

2. Paste Bar Code in prescribed space.

उत्तरपत्रिकेवरील विहित जागेतच बार कोड लावावा.

3. Do not write anything on bar code sticker, otherwise it will be treated as unfairmeans.

बार कोड स्टिकरवर काहीही लिहू नये, अन्यथा परीक्षा गैरप्रकार समजला जाईल.

Q. No.	Examiner		Moderator	
1				
2	1	1		
3	1	2		
4				
5	1	2		
6				
7	1	5		
8				
9				
10				
11				
12				
Total in Figure		50		
Total in Words		फifty		
Signature		9		

**Supplements attached**

Main Answer Book	No. of Supplements	Total
1	+ 3	= 4

Specific remarks of Centre conductor regarding malpractice (in Red ink)

Total	Marks in Figure	Marks in Words	Sign
Examiner	50	फifty	9
Moderator			



	Q.No.					TOTAL
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M						



SPPU-3/24

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प्र. क्र / Q.No. 0.7) → 1.

9) → ?

→ We have here given a page sequence, we have to count page fault (where No of frame = 3) we need to find page fault while storing it

① FIFO → First In First out

- here the page that entered in first at beginning get out in first
- This is most simple to implement
- when we have given a page sequence we go from left to right checking

The FIFO for given sequence will be:-

Column →	2	3	2	1	5	2	4	5	3	2	5	2
(frames) 0	2	2	2	2	5	5	5	5	3	3	3	3
1		3	3	3	3	2	2	2	2	2	5	5
2				1	1	1	4	4	4	4	4	2
Page fault	*	*		*	*	*	*		*		*	*

No. of page Fault = 9

as we need to calculate page fault we checked the No of times the page changed the pages for its efficient use





SPPU-4/24

	Q.No.						TOTAL
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Savitribai

Q. No.

Q. No. / Q.No.

Q7) → ?

a) → (continues)

→ ② LRU. (Least Recently used)

here LRU means Least Recent Used means here unlike the FIFO only Left side of pages are checked for getting Least Recent pages & the one which is Not used Recently is Replaced. it is also efficient way but much complicated than FIFO.

The LRU For given sequence will be:-

column →	2	3	2	1	5	2	4	5	3	2	5	2
0	2	2	2	2	2	2	2	2	3	3	3	3
1		3	3	3	5	5	5	5	5	5	5	5
2				1	1	1	4	4	4	2	2	2
page fault →	*	*		*	*		*		*	*		

No of page Fault by LRU is → 7

As we know here in page sequence the Most Recently used pages are preserved & the Least Recently used are eliminated to decrease the page faults to some extent. it is simpler technique than the Optimal solution.





	Q.No.					TOTAL
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Q. No.

Q.7) → ? (a) (continue)

a) →

→ The working of FIFO.

- 1) Find the first page insert it
  - 2) insert pages upto our frames are full
  - 3) Once frame are full if similar page number is inserted No change is done
  - 4) if the page number is other than the page number used in frames the one page will be Replaced from frame.
  - 5) The Replacement is decided by FIFO
  - 6) according to FIFO the element/page which entered first should go out first.
- ex:- we inserted 2 at beginning  
 then 3 is inserted  
 then 1 is inserted  
 but when 5 comes then it is needed to Replace one page as Maximum size of frames is 3  
 here it is checked which come in first that is Replaced  
 → 2 come first so 2 Replaced by 5.





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प्र. क्र / Q.No.

Q.7) → ?

प्र. क्र  
Q

a) → (continue) → ?

→ working of LRU (Least Recently used)

- 1) Similar process is followed as FIFO until frames are full
- 2) once the Replacement is needed
- 3) here the checks are made on left side of the sequence.
- 4) The most Recent are preserved which are in frame & the
- 5) Least Recently used / which is not Recently Used is Replaced.

ex:- we insert 2, }  
 we insert 3, } (maximum frames, 3)  
 we insert 1, }  
 now 5 comes then we know that 1 & 3 are Recently used & cannot be Replaced the 2 is Replaced by 5

& similarly when we Replace or insert New page that is called to be as Page fault.





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प्र. क्र / Q.No.

a.7) → ?

b) → (?)

→ Fragmentation is occurred when multiple process take program memory assigned to them. The fragments are made of the program & the holes are remained while doing fragments. The holes are called as free spaces.

→ The fragmentation is carried out by memory Management Unit (MMU)

→ It is broadly divided in 2 types

- ① internal fragmentation
- ② external fragmentation

① Internal fragmentation → when

when there is variable size storage of the programs/process in memory then the continuous placing of process result in Internal fragmentation.

Kernel	→	Kernel	
P <sub>1</sub>	} 10KB } 20KB	P <sub>1</sub>	} 10KB 18KB (P <sub>2</sub> )
P <sub>2</sub>			
P <sub>3</sub>	} 10KB } free space	P <sub>3</sub>	} 10KB } free space
free space			

→ 2KB (free)





Q.No.							TOTAL
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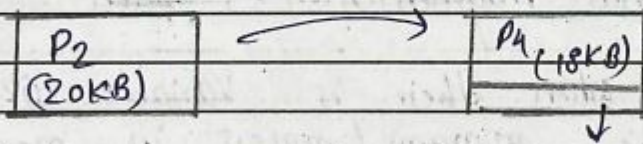
Q. No. / Q.No.

Q.7 → ? (continue)

b)

→ here in above figure the process P<sub>2</sub> is divided given (20KB) space when it is executed & terminated then the (20KB) place remain as the internal fragmentation here pages which are fixed. So now the other process P<sub>4</sub> enter then it will take (18KB) as required by it & (2KB) will be the free space generated,

this free place space generated in between process make system overhead & increased storage space so concation is used to take all free places together



here when the P<sub>2</sub> is terminate P<sub>4</sub> acquire it and take only 18KB other 2 is

then internal fragment generated

Internal Fragmentation is suffered by  
Paging

Segmentation eliminate Internal Fragmentation





Q.No.						TOTAL
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Q. No.

--

Q.7) → ? (continue)

→ ② external fragmentation

→ The segmentation suffer from the external fragmentain

→ Wherear the paging eliminate external fragmentation

When we store program in uncontiguous method, the large spaces are generated which can be free to use, if a program need (200KB) we have memory of 200KB in free but allocated at different places so can't give the program enough memory.

but here advantage is we can store the minimum length program which need free spaces,

here free spaces are large like (40KB) not-anilike internal fragmentation so the memory used efficiently.

if  $P_1, P_2, P_3$  enter with in memory. Variably in non continuous manner

kernel
$P_1$
free space
$P_2$
$P_3$

→ OS

} Randomly placing process lead external fragmentation





Q.No.						
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प्र. क्र / Q.No.

Q.7) → (b)

b) → (continue) → 2

→ The buddy system is the way of dividing memory in 2 parts to give each program required memory. it is mostly used memory allocation system for some of old computers which are not modified, it takes more time as degree of multiprogramming is increased. it is used because of its simple mechanism.

Buddy System →	D.S		→ operating system
	256 KB		→ memory
	123 KB	123 KB	
	12.3 KB	12.3 KB	
	60 KB	63 KB	100 KB
Free space.			

so here in buddy system the 0.5 divide memory in 2 parts when the user require to store (100KB) since by doing this it is keeping other part empty free & also empty for further execution of programs inserted. if 100KB enter 256 divided in 2 part if 123 KB is given 100KB it is stored. So No storage wastage or very less storage wastage in buddy system.





	Q.No.					TOTAL
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Q. No.

Q.3) → ?

a) → ?

→ Their are different types of scheduler which are :-

- ① long term schedule
- ② Short term schedule
- ③ Medium term schedule

→ get in detailed about scheduling of process.

(ii) long term schedule (contains variable character)

→ also called as Job scheduler

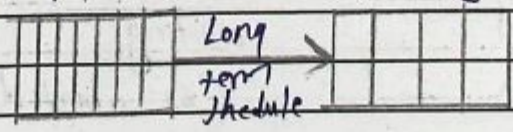
→ here the Queue of process is made.

→ it is from SET to Ready state

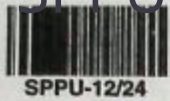
→ The multiple program in queue enter this schedule the scheduler dispatch one by one allow it to enter Ready state

→ when it is in top of queue then it is send to primary memory or Ready state. by long term scheduler

→ Make batches from similar jobs.   
 no of process → primary memory.







Q.No.						TOTAL
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Q. No. 3) →

a) → (continue)

① short term scheduler (contain variables)

→ it is also called as CPU scheduler

→ it send process to CPU for process execution

→ here the short term scheduler doesn't support degree multi programming

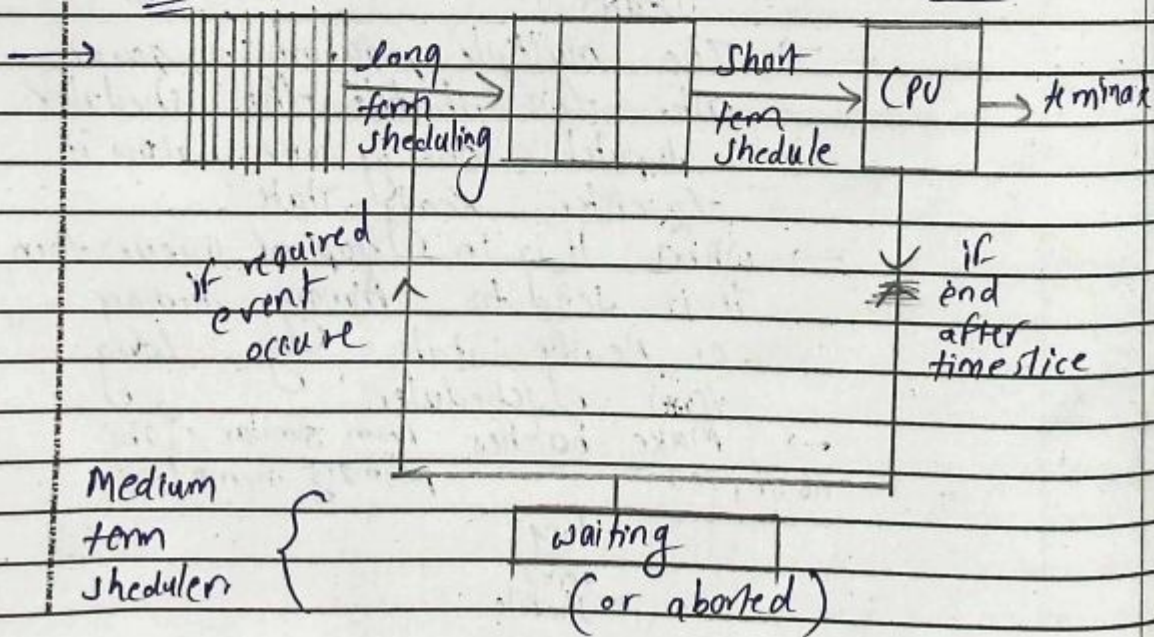
→ & also take process from Ready → Running states

→ if process is send to CPU it is executed then it is placed in terminated

→ if not then Blocked state.

→ the dispatch is done by dispatcher

set queue → in this Resources are allocated



Medium term scheduler

waiting (or aborted)





Q.No.						TOTAL
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T. No./Q.No. 3) → ?

a) → 2 (cont'nw)

②

→ (iii) medium term scheduling

→ mainly used for swapping purpose.

→ The medium term take more time than long term &amp; less time than short term.

→ When a process while it CPU passes the given amount of timeslice then the medium term scheduling come

→ &amp; replace the process &amp; make it go in blocked or waiting state

→ when the process get Resource it Required then again it Rollback in main memory

So this are 3 typer of scheduler





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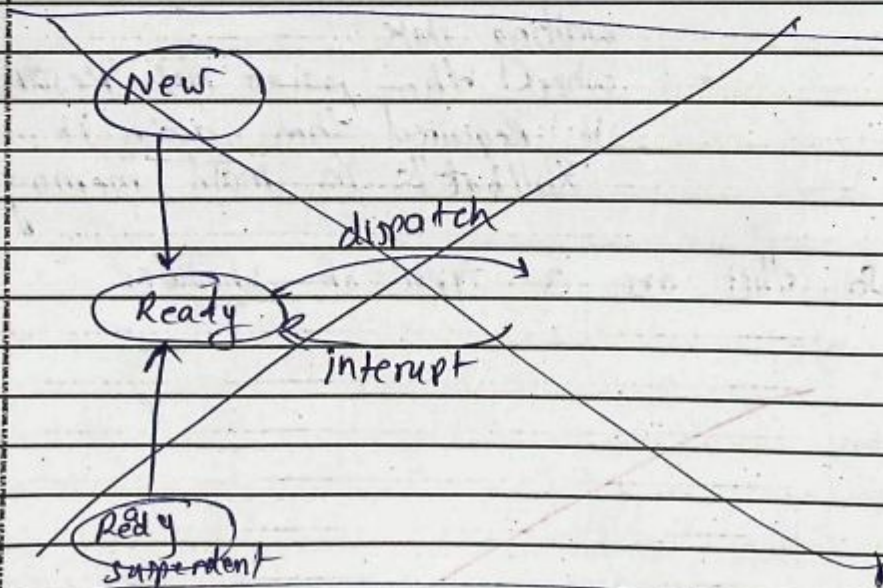
प्र. क्र / Q.No.

Q.3) → 2

b) → 2 (answer)

→ The seven state process model is based on both virtual memory & physical memory. Their are 7 states are

- 1) ~~set~~ New
- 2) Ready
- 3) ~~aborted~~ Block suspended
- 4) Ready suspended
- 5) Running
- 6) Block
- 7) exit. (continue) →











	Q.No.					TOTAL
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Q.No.

3) → ? (Continue)

→ ④ Block Suspent - virtual memory make process suspension

⑤ Running - The Resources are given to the process

⑥ if Ready → virtual memory make time slice suspension

⑦ exit → terminate process

→ The 7 state model is different from 5 state as 2 new states get introduced by inserting virtual memory

here in 7 state virtual memory play important role

while in 5 state only main memory process are their

→ The suspended state play very important role

→ The 7 state is more efficient than 5 state model the 5 state model

6) contain) :-

New → The process taken

Ready → process came to top of queue

Running → Resources are given to process

Waiting → time slice expired or not have

exit → terminate Resource





Q.No.					
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Q. No.

Q.5

→ ?

a) ? → ?

→ (i) Semaphore

→ Non negative integer variable

⇒ prepared by dijestra

→ in semaphore mainly critical

section problem are solved

it have 2 state

① wait

② signal

When semaphore (P, V) are defined

the P actually is used to enter critical section. (P=0)

The V is usually for exiting critical section. (V=0) Enter

The wait condition is one which process is in remainder state & want to enter critical section so

Semaphore counter set

$$S = S - 1 \text{ in (wait)}$$

&amp;

set  $S = S + 1$  in (V) or signal state

When particular process want to exit

→ They are here to make Mutal exclusion

→ They can only be integer values





	Q.No.					TOTAL
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Q. No.

Q.5] → 1

d) → 2 (continue)

→ ii) Monitor

→ it is simply the combination of procedures, variables, & symbols.

→ monitors are also in critical section when one process want to go inside monitor & it is acquired by state executable that will not allow other process.

→ The monitor basically act as a object information store. whose the view of monitor is given to user.

→ when  $S=0$  process can enter monitor  
 $S=1$  it is already occupied

→ when the process need monitor it calls CPU  
 the process can be

- ① process calls CPU (calling state)
- ② the CPU prevent the process from monitor
- ③ monitor is freed now the process can enter.





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Q. No.

Q.5)  $\rightarrow a) \rightarrow ?$  $\rightarrow$  iii) Mutex

$\rightarrow$  Mutex is similar to lock where 2 functions are carried in critical section

 $\rightarrow$ 

if  $S=0$  then unlocked mutex

$S = \text{ant bit value then locked mutex}$

$\rightarrow$  it is a bit function

$\rightarrow$  when in exclusive mutual software approach or hardware the mutex simply perform and help process getting resources & getting inside the critical section

$\rightarrow$  mutual exclusion

- means when 2 process need same resource the mutex lock it.

& then the ~~new~~ process get excluded and only then the next process is allowed.

6  $\rightarrow$





	Q.No.					TOTAL
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S / Q.No.

Q.5) →? (6)

b) →?

→

deadlock — When multiple process require same Resource the deadlock occurred.

The need of mutual exclusion or Synchronisation lead to - deadlock - starvation

the deadlock is more danger than starvation.

There are 4 deadlock operations

- ① deadlock prevention
- ② deadlock avoidance
- ③ deadlock detection
- ④ deadlock recovery

→ First we will get through condition that will create deadlock they are

- ① mutual exclusion
- ② hold & wait
- ③ No preemption
- ④ circular wait

→





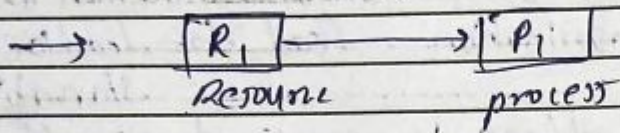
	Q.No.					TOTAL
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प्र. क्र / Q.No.

Q.5 → ?

b) → (continue)

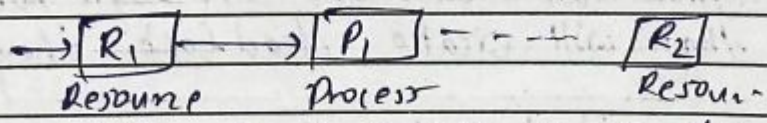
① → mutual exclusion  
 → when Resource is held by process exclusively.



here this exclusive technique does not allow other process to take R<sub>1</sub> & hence dead lock occur.

② hold & wait

If a process hold a Resource & wait for other Resource dead lock or occurred.



When if P<sub>1</sub> is holding R<sub>1</sub> & want R<sub>2</sub> then the dead lock is occurred.

③ No preemption :-

→ preempt means to terminate





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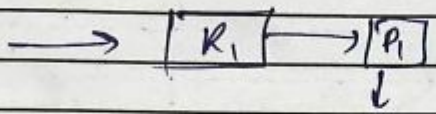
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प्र. क्र / Q.No.

a) → ?

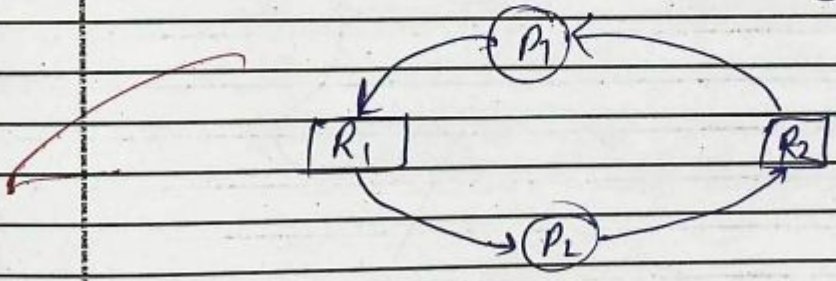
b) → (continue)

→ ③ No preemption → when no preempt of process is allowed to CPU so CPU cannot terminate the process hence deadlock occurred



↓  
No preempt or termination of P1 allowed to CPU

④ circular wait → if the hold and wait occurred in two process they form circle causing deadlock



→ P1 is holding R2 & need R1  
P2 is holding R1 & need R2

hence deadlock occurred.

KSKA Git

d





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Write the answer book in blue or black ink/ball pen only and use of pencils in case of diagrams & sketches.

Pr. No./Q. No.

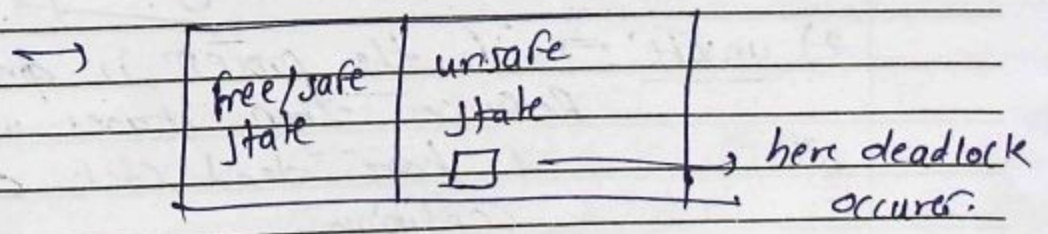
Q. 1)

→ ?

b) → ? (continue)

→ So we have given up 4 condition to which deadlock can occur  
eliminating one condition can cause deadlock avoidance

deadlock prevention - The worst case are performed & the data is given into 2 states





## INSTRUCTIONS

### सूचना

1. DO NOT WRITE NUMBER ANYWHERE EXCEPT AT THE PLACE PROVIDED FOR. IF SEAT NUMBER IS WRITTEN ANY WHERE ELSE IT WILL BE TREATED AS UNFAIRMEANS AND THE PERFORMANCE WILL BE TREATED AS NULL AND VOID FOR THE ENTIRE EXAMINATION.
१. नियोजित जागेशिवाय अन्यत्र आसन क्रमांक लिह नका. अन्यत्र आसन क्रमांक लिहिल्यास ती गोष्ट अनुचित समजली जाईल आणि त्या संपूर्ण परीक्षेच्या संदर्भात परीक्षार्थी म्हणून त्यास बाद ठरविले जाईल.
2. WRITE YOUR ANSWERS IN LEGIBLE HAND. ANSWERS WRITTEN IN AN ILLEGIBLE AND UNDECIPHERABLE HAND ARE LIABLE TO BE MARKED AS ZERO.
२. उत्तरे सुवाच्य अक्षरांत असावीत. अवाचनीय आणि अनाकलनीय अक्षरांत लिहिलेल्या उत्तरांना शून्य गुण दिले जातील.
3. AN ACT OF COPYING OR OF IMPERSONATION AT AN EXAMINATION IS PUNISHABLE UNDER 'THE MAHARASHTRA PREVENTION OF MALPRACTICE AT UNIVERSITY, BOARD AND OTHER SPECIFIED EXAMINATIONS ORDINANCE, 1982'. THE ACT PASSED TO THE EFFECT.
३. कॉपी करणे किंवा दुसऱ्याच्या नावावर परीक्षेस बसणे यांसारख्या कृती 'महाराष्ट्र-प्रीव्हेंशन ऑफ मालप्रॅक्टिस अँड युनिव्हर्सिटी, बोर्ड अँड अदर स्पेसिफाईड एक्झामिनेशन्स ऑर्डिनन्स, १९८२' त्यानुसार संमत केलेला कायदा या अन्वये दंडही असेल.
4. Hollow Craft is to be pasted on space marked with dotted line.
४. होलो क्राफ्ट स्टीकर विहित जागेवर लावावी.

प्र. क्र./Q. No.

Q.5) → 2

b) → (online)

deadlock prevention — when the process know  
by giving Resource the  
process enter unsafe state  
the ~~in~~ Reverse Resource manager  
deni for The Resource

1) Safe — no deadlock can ever  
occur by giving Resource to  
process

2) unsafe → if the process is given  
Resources then it goes unsafe  
& have dead lock occurring  
condition



प्र. क्र./Q. No.

Q45) → 2

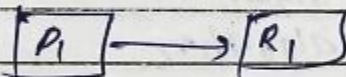
5) → (continue) →

→ dead lock detection → when any of 4 condition is seen then the deadlock is detected.

deadlock Recovery →

→ There are 4 steps of deadlock Recovery =

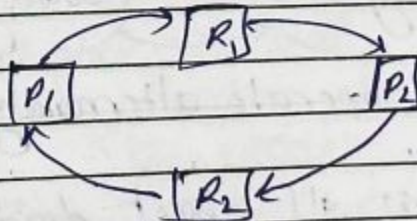
① Process termination → process is terminated



Process ended so R1 is free to use  
deadlock avoided

② Preempt process

→ When we delete one process & give resource to other the deadlock can be avoided.



if we CPU eliminate one process other get resources



Q. No.

Q 5) → ?

b) → 2 (continue)

→ ③ starvation

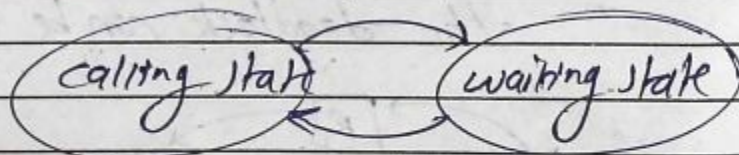
— one process is left with no resources  
hence the process allowed to starve.  
to other are given resources taken from  
it

There are many algorithms also to avoid  
deadlock

- ① Brewers algorithm
- ② Peterson algorithm

① Brewers algorithm → Multiple programs  
set alternate by flags  
& turn the process and  
execute concurrently

② Peterson → contain 2 process entry  
technique



2 process operate alternately

So this was all about deadlock prevention  
avoidance & detection



## SPPU-TE-COMP CONTENT - KSKA Git

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प्र. क्र./Q. No.

Q. 12) → ?

a) → (answer)

→ absolute loader

→ all the things like relocation, allocation, & linking are done by compiler

→ only thing absolute loader do is  
Load given object code with  
instruction in memory

→ in the absolute loader

- ① The relocation done by programmer or assembler
- ② The allocation done by programmer or assembler
- ③ The linking is done by assembler

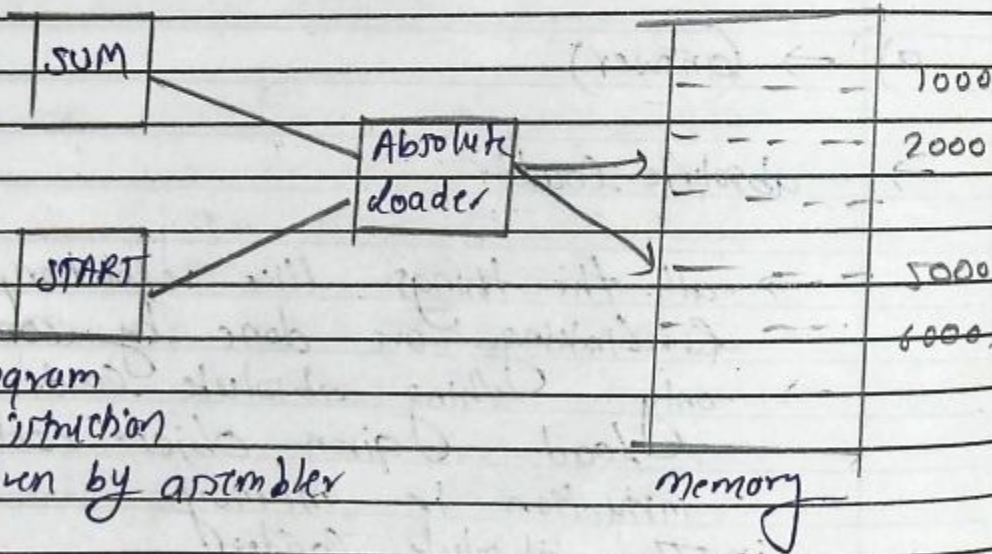


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२. उत्तरे सुवाच्य अक्षरांत असावीत. अवाचनीय आणि अनाकलनीय अक्षरांत लिहिलेल्या उत्तरांना शून्य गुण दिले जातील.
3. AN ACT OF COPYING OR OF IMPERSONATION AT AN EXAMINATION IS PUNISHABLE UNDER 'THE MAHARASHTRA PREVENTION OF MALPRACTICE AT UNIVERSITY, BOARD AND OTHER SPECIFIED EXAMINATIONS ORDINANCE, 1982'. THE ACT PASSED TO THE EFFECT.
३. कॉपी करणे किंवा दुसऱ्याच्या नावावर परीक्षेस बसणे यांसारख्या कृती 'महाराष्ट्र-प्रीव्हेशन ऑफ मालप्रॅक्टिस अँड युनिव्हर्सिटी, बोर्ड अँड अदर स्पेसिफाईड एक्झामिनेशन्स ऑर्डिनन्स, १९८२' त्यानुसार संमत केलेला कायदा या अन्वये दंडही असेल.
4. Hollow Craft is to be pasted on space marked with dotted line.
४. होलो क्राफ्ट स्टीकर विहित जागेवर लावावी.

प्र. क्र./Q. No.

Q.2) →  
a) →



program :-

→ START 1000  
 SUM 2000  
 JMP 3000.





प्र. क्र./Q. No.

Q.2) → 1.

a) → (continued)

→ So as we can see from diagram that the loader simply take the instruction & Address and place them in memory

→ in absolute loader both loader & Assembler are in memory so take lot of place.

There are 2 table Read & terminate disk

they are as

for entire instruction (Read)

column	type of tape	length (2)	3-5	6-7	8-72	72-80
data	0	length	type	empty	instructions	id. of tape

for start of program

column	type of tape	length (2)	3-5	6-7	8-72	72-80
data	1	0	type	empty	empty	id of tape

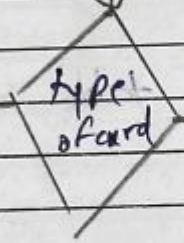


Sl. No./Q. No.

[ ]

START

Set LIVLOC  
to (3-5)

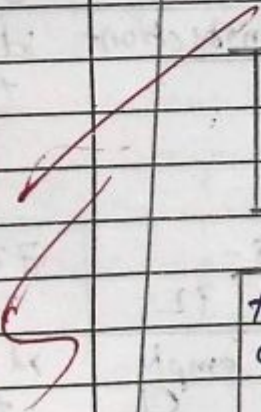


taken LEN  
at  
(2)

Start  
operation  
performed

taken LEN  
and instruction  
(8-72)

- This was working  
of absolute loader







प्र. क्र./Q. No.

Q.2) ↔ 2

b) → The DLL refers to direct linking libraries which are stored in system as

.dll.

→ When the static libraries want to execute the .exe they call small units called .dll to process

→ in .dll are not self executable

→ the .dll dynamic linking library need .dll multiple files to execute or need .exe files

→ DLL are small structures which are for simple purpose like

→ FOND.dll (changing font)

### सूचना

1. DO NOT WRITE NUMBER ANYWHERE EXCEPT AT THE PLACE PROVIDED FOR. IF SEAT NUMBER IS WRITTEN ANY WHERE ELSE IT WILL BE TREATED AS UNFAIRMEANS AND THE PERFORMANCE WILL BE TREATED AS NULL AND VOID FOR THE ENTIRE EXAMINATION.
१. नियोजित जागेशिवाय अन्यत्र आसन क्रमांक लिहू नका. अन्यत्र आसन क्रमांक लिहिल्यास ती गोष्ट अनुचित समजली जाईल आणि त्या संपूर्ण परीक्षेच्या संदर्भात परीक्षार्थी म्हणून त्यास बाद ठरविले जाईल.
2. WRITE YOUR ANSWERS IN LEGIBLE HAND. ANSWERS WRITTEN IN AN ILLEGIBLE AND UNDECIPHERABLE HAND ARE LIABLE TO BE MARKED AS ZERO.
२. उत्तरे सुवाच्य अक्षरांत असावीत. अवाचनीय आणि अनाकलनीय अक्षरांत लिहिलेल्या उत्तरांना शून्य गुण दिले जातील.
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४. होलो क्राफ्ट स्टीकर विहित जागेवर लावावी.

प्र. क्र./Q. No.

Q-2)

→ ?

b) → dynamic link library are small where as static link library are larger

The difference can be.

dynamic link library

static link library

→ contain .dll

→ contain .dexe files

→ run during runtime executed

→ Executed during runtime

→ need small memory

→ need larger memory or size is more

→ shorter life span

→ longer life span

ex:- .dll

ex:- lib., exe.

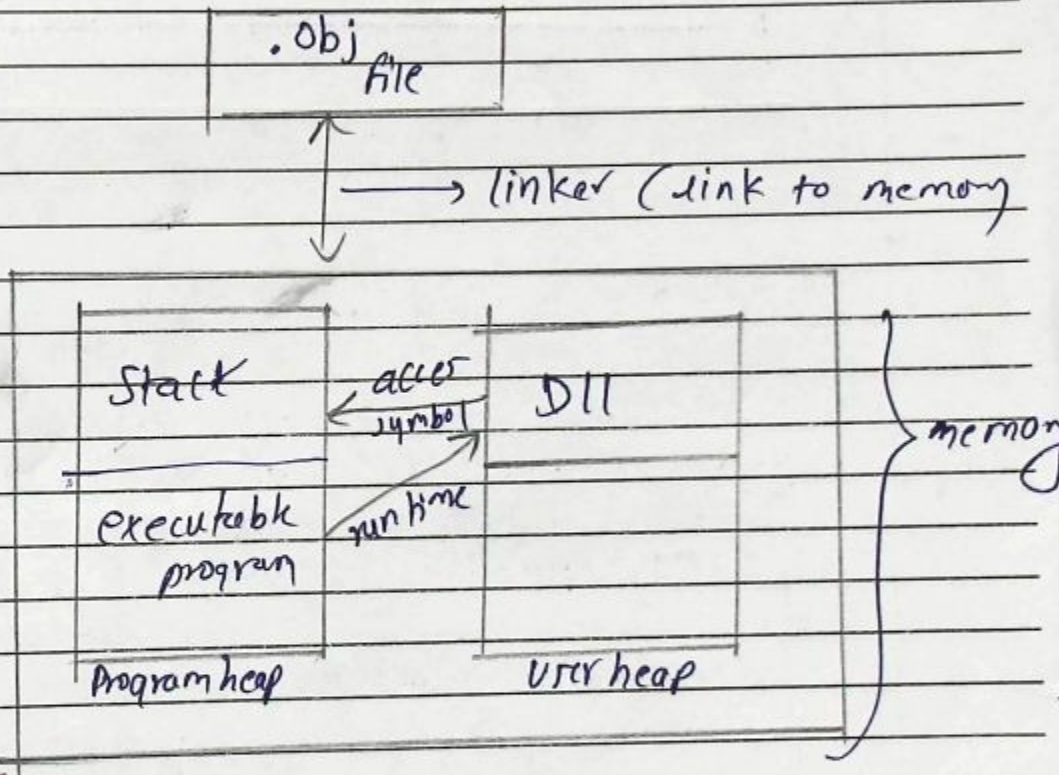




Pr. No./Q. No.

b) → ?

→ The need for DLL is to execute the process by adding multiple dll already stored in computer or mobile



6. The stack is contained with symbol the DLL access it use them then executable program while Run time are dll files.

This was all about the DLL example it → kernel.831