

33

$$1 \text{ word} = 4 \text{ bytes} = 2^2 \text{ bytes}$$

$$\text{Page Size} = 8 \text{ KB} = 2^{13} \text{ bytes}$$

B

$$\text{No of words in 1 page} = 2^{13} / 2^2 = 2^{11}$$

TLB can hold 128 valid entries.

$$\text{TLB misses} = 128 \times 2^{11}$$

$$= \cancel{128 \times 2^{11}}$$

$$= 256 \times 2^{10} \text{ Ans}$$

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Sets :-

S1: set of all recursively enumerable languages over the alphabet  $\{0, 1\}$

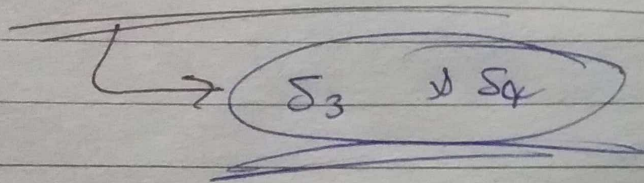
b

S2: Set of all syntactically valid C programs.

S3: Set of all languages over the alphabet  $\{0, 1\}$

S4: Set of all non-regular languages over the alphabet  $\{0, 1\}$ .

Sets are uncountable -



Q :-

35  $\forall x [(\exists z (z/x \Rightarrow ((z=1) \vee (z=1))) \Rightarrow \exists w (w > x) \wedge (\forall z (z/w \Rightarrow ((w=2) \vee (z=1))))]$

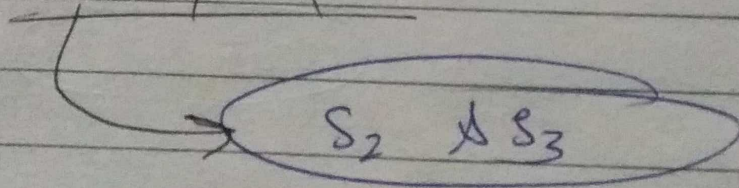
Sets:

S1:  $\{1, 2, \dots, 100\}$

S2: Set of all +ve integers

S3: set of all integers.

Satisfy Q :-





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Production rule	Semantic Rule Action
$D \rightarrow TL$	$X_1.type = X_2.type$
$T \rightarrow int$	$T.type = int$
$T \rightarrow float$	$T.type = float$
$L \rightarrow L_1, id$	$X_3.type = X_4.type$ $add\_type(id.entry, X_3.type)$
$L \rightarrow id$	$add\_type(id.entry, X_5.type)$

Sol<sup>n</sup>

$D \rightarrow TL \quad \{ L.id.type = T.style \}$   
 $T \rightarrow int \quad \{ T.style = int \}$   
 $T \rightarrow float \quad \{ T.style = float \}$   
 $L \rightarrow L_1, id \quad \{ L_1.type = L_1.type \}$   
 $\quad \quad \quad add\_type(id.entry, L_1.type)$   
 $L \rightarrow id \quad \quad \quad add\_type(id.entry, id.type)$

$X_1 = L, X_2 = T, X_3 = L_1, X_4 = L$

Ans

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$n$  unsorted arrays & odd:  $A_1, A_2, \dots, A_n$   
 worst case time complexity of median of medians  
 of  $A_1, A_2, \dots, A_n$ .

Sol<sup>n</sup>

$$O(n) + O(n) + O(n)$$

$$O(n^2) + O(n)$$

$$= O(n^2)$$



~~36~~ ~~Q~~  $G$  be any connected, weighted, undirected graph.

~~F~~  $G$  has a unique minimum spanning tree, if no two edges of  $G$  have the same weight.

~~II~~  $G$  has a unique minimum spanning tree if, for every cut of  $G$  there is a unique minimum weight edge crossing the cut.

True :-

Both True

~~39~~

~~40~~ ~~I~~ The smallest element in a max-heap is always at a leaf node.

~~A~~ ~~II~~ The second largest element in a max-heap is always a child of the root node.

~~III~~ The max heap can be constructed from a binary search tree in  $\Theta(n)$  time.

~~X~~ ~~IV~~ A binary search tree can be constructed from a max-heap in  $\Theta(n)$  time.

True

I, II & III



41 →

2

Process	P <sub>1</sub>	P <sub>2</sub>	P <sub>3</sub>	P <sub>4</sub>
Arrival Time	0	1	3	4
CPU Burst time	3	1	3	2

Average waiting time = 1 milli second.  
2 = ?

Sol → Let z = 2

P <sub>1</sub>	P <sub>2</sub>	P <sub>1</sub>	P <sub>1</sub>	P <sub>4</sub>	P <sub>3</sub>
0	1	2	3	4	6

	Arrival time	CPU time	Completion time	Waiting time
P <sub>1</sub>	0	3	4	1
P <sub>2</sub>	1	1	2	0
P <sub>3</sub>	3	3	6	3
P <sub>4</sub>	4	2 = 2	6	0

Average waiting time =  $\frac{1 + 0 + 3 + 0}{4}$

= 1 milli second

So, z = 2 Ans



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index mode — indirect  
 one single — indirect, one double — indirect  
 disk block size = 4 KB,  
 address = 32-bits.  
 max file size in GB = ?

4

Sol<sup>n</sup>

$$= 2^{10} \times 2^{12} \text{ B}$$

$$= 2^{32} \text{ B}$$

$$= 4^{16} \text{ B}$$

$$= 4 \text{ GB} \quad \text{Ans}$$

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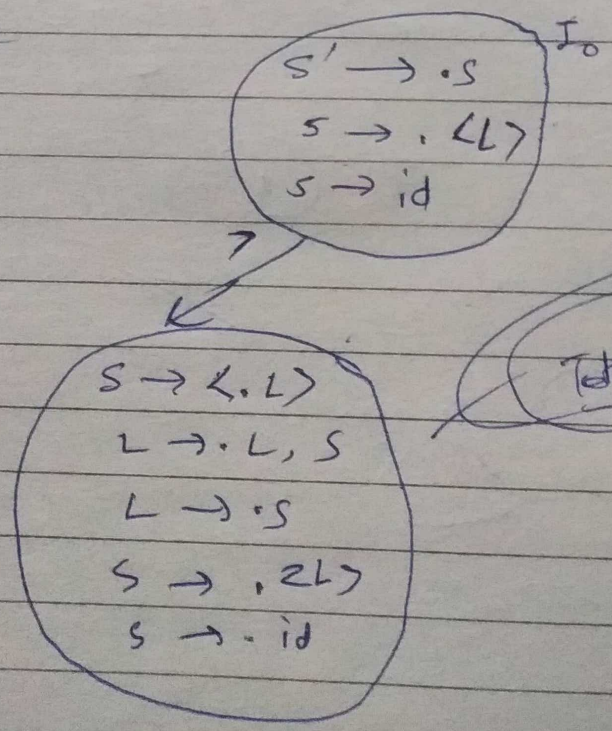
$S' \rightarrow S$   
 $S \rightarrow \langle L \rangle \mid id$   
 $L \rightarrow L, S \mid S$

$Z_0 = \text{CLOSURE}(\{[S' \rightarrow \cdot S]\})$

$\text{GOTO}(Z_0, \langle \rangle) = ?$

5

Sol<sup>n</sup>



Total items =

= 5 Ans