Ques-1: Write linear yearch grendo code to search an
Ques-1. Write linear search pseudo code to search an element in a sorted array with minimum no of combarison.
comparison.
Solly wool and the soll and the
void linears earch (int A[], int n, int key)
2 int flag=0
$ \int_{-\infty}^{\infty} \int_{-\infty}^{$
3 - 9f (A[i] = = key)
S CINO-1: CONTRACTOR OF CONTRA
S flag=1; breaks
and the company of a second se
the second of th
if (flag == 0) contec"Not found" else
confec" Not found
condect found ";
4 Cow C Journa ,
<u>g</u>
Qui:2 Write pseudo code for iterative and recursive insertion
sort. Insertion sort is called online sorting. Why? what about other sorting that has been Idisumid.
about other sorting that has been Idisustid.
1901
Iterative: for $i=1$ to $m-1$ $t=A(i), j=i-1$
t=A(i), j=(-1
while(j>=0 88 ACj)>+)
Sif (AG+1) = AG)
9 11 (1.9.13 1.9.1
j-
η (1.5 · · · · · · · · · · · · · · · · · · ·

Remrsive!	Merchalling Committee
void insertionSort (intarc), int n)	ALTON LORD WAYNA
ALENA AL	adricant/A
\$ 9f (n<=1)	182 -13309
	1 10111111
	10/69/41
int last = ars[n-1], j = n-2;	Be bina
	02.20011
S om (1+1) = an (3);	02 151115
75	(02 C(0)))
4	
are [j+1] = last;	On & Walerken
1 2 the 2 it ready physiques and bus and	e autoi todu
	This strong
Insertion Sort is an Online algorithm 1	recause insertion
sort considers one input element per	
and broduces a bastial solution without	
future elements.	1 12 20
But in case of other sorting algorithm accurs to the entire o input, thus there	n, we require
access to the entire o input, I thus there	are offline
algorithm in mutar property	Mindell Committee of the
Ques-3; complexity of all sorting, algorithm the	it has been discussed.
Sol Algorithm Workcase V Bestase	Average Cax.
Butble sort O(n2) O(n)	0(n2)0
Selection Sort 0(n2) 0(n2)	0(n2)
ansertion sort o(n2) o(n)	D(m2)
Count sort O(n+K) O(n+K)	O(n+K)
quick sost 0 (m2) 0 (n log(n))	D(n(logn))
metgesost O(n(logn)) O(nlogn)	D(nlogn)
theap sort O(n (hogn)) O(n (hogn))	O(n(lopn))

		Date				
Que-y.	Divide all sortin	na alamithms	into inplace	Stable Online.		
Ans	agent by the (or high	Jan Hara	(C) X 21 - 29 1 1 18	Atow. 🥦		
	Algorithm	Implace	Stable	Online.		
	Bubble Sort	V	~	X		
	selection Sort	V	X	X		
	Insertion Sort	10/2 10/180	197			
	Count Sost	The X said	211	X		
	Merge Sort	Pak X CO	1 VI	X		
	quick sost	· · ·	X	X		
	Heap Sort		X	X		
	Pullar Wille P. D. I	STATE OF	THEAT			
		y factor and	MISE	7,000		
Qui-5!	Write Remosive/ It	terative pseud	o code for	binary search		
			xity linear	Bingny Search		
	sive and Heratur)	U			
Sol:	Recursive	Deliver old	NO 21 - 100	2 reflering		
	and home Coards	0	nd A Inda	mengy type 4		
	int binangearen	(int ant), in	וו לאוול אווי	mit rey)		
	S 17 (87=1)		· 2 Man y	xela color		
dug	I gint m	id = l+ (8-l	10. 10	5/89 12 hor		
3.00		The state of the s		- of word		
	Che Mark Land	car[mid] ==	pay return	mid;		
	offor	o[mid] > key	1	ers adult 4 14		
Joseph V.			1 (1)	Ames Comble		
ortum binary Search (arr, l, mid-1, key);						
VOLES	eld (W)O	CEN	0 60	RINKHIN I		
return binary Search (arr, mid+1, r, key)						
(CHO) (NO) (CHO) 1000						
(4) Ext	A 9	(3)	p10 +80	2 kins		
(Copul)	sptum -1:	(2)	19 4	of trup		
(mole		a brodie	10 30	02 - 121 201		
2	A Comment of the Comm					

and a second			~ ~~~	******************
Herative:	C-7A - 1514	Laste Live	odeni al-bi	Car of Acres
			1, intrint	
				(Alan
2 while	R(78)	· Clife to	muz Siav	
50	0.0			A
7 177	m= x+(8-1)/2;	valtros l	
· · · · · · · · · · · · · · · · · · ·	flars[m]:	== key) ? m;	il ros	NEW TO
	setum	m;	W	THE
3+ [ars[m] < Ke	4)	29111	
CP (S) (S)	l=m+1;	1317000	P. Wallet	
Place		nadd v		
(44)	8=m-1;	June - Carl	9	
24		-/8	All reason	
retum -1	;	38		
2		i ++1		
1 of the land that	Time complexity		Space Complexity	
- 12 million that	Reunive		Remoter	Heratin
linear search.	0(m)	0/2)	DUD	0(1)
Binary Search.	O(logn)	O(logn)	0(1)	0(1)
The I dixilarian	(19/16/200) 187) (100 000	the wife from	19871
	tria xi h	dod studio	Jan not h	
Dur 6 Write Reur	ane felatio	n for bina	my remosive !	search,
And.		1 2		
T(n) =	T (n/2)+2	L	V	
	colored con		NESON L'EST	A . 1 8 :001
	Per la		Instruct d	E OY E
	A Jeune Fuel 18	A STATE OF THE PARTY OF THE PAR		2 1

find two indices such that A[i]+ A[j] = K in minimum time void Sum (int Al), int k, int n Sort (A, A+n); int i=0 , j=n-1; while (i<) (ACI)+ACI) == A (i) A function has while loop it ix D/n) complexity Our-8: Which sorting is best for practical uses & Explain. In practical luser Ans: , we mostly Stability Sort because of its data. can best merge sost the time complexit in all cases

Dusc.
Our-11. Write Remonde relation of merge sort and buck sort
in best and worst case. What are the similarties between
complexities of two algorithms and when?
Sol . Was a Classic with the same of the s
Algorithm Remance Relation
Best case Worst Case
Quick Sort T(n) = 2T(n/2)+n T(n) = T(n-1)+n
Merge Sort T(m)=2T(n/2)+n T(n)=2T(n/2)+n
Both the algorithms are based on the divide and
conquer algorithm. Both the algorithms have the
Same time complexity in the best case
and average because both the algorithm divides
array into subparts, sort, them and finally merge
all the sorted parts.
Can
Ours: Selection sort is not stable by default but you write
a version of stable selection sout.
Soln: As the selection sort is not stable because
It changes the relative position of same elements often
sorting.
Selection sort can be made stable it instead of swapping
the minimum element is placed in its position without (
swapping ice by placing the number in its position
by bushing every. I element one step forward.
In Simple words use insertion sort technique which
means inserting element in its correct place.
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what it were the best of the b
physical and south our test our the fell hat continued
se O(nlogn).

```
Pseudo code for stable Selection Sort:
     void stable selection Sort (int A[], int n)
        for (int i=0; i<n-1; i++)

s int min = i;
            for (int j= it) j(n j j++)
                   if (A[min]>A[j])
           int key = a [min];
          While (min>i)
                a[min] = a[min-1]
  an waring the war 312 ra 80 0 to MM o took refusion and ittinu
  epileson larestan lova lavestant for let some
 s; for the origin of Car , was use the External
Our-13: Bubble Sort scans whole array even when array is sorted.
Can you modify the bubble sort so that I't doesn't scan the whole
 array once it is sorted.

of we can modify bubble sort by flacing a flag
 vanable. If array is already sorted we can half the process by thecking the flag variable if its value changes or not.
 Pseudo code for Modified bubble soot
   void bubble (int ACI, int n)
             of for (int i=o; icn; i++)
                   of int swaps = 0;
```

```
tor (int j=0; j<m-i-1; j++)
           H (ACJ) > ACJ+1)
            S Swap (A[j], A[j+1],
          (swaps == 0)
           break;
Que-14: Your computer has a RAM of 2 GB and you are given an
   array of 4 GB of sorting. Which algorithm you are going
 to use for this purpose and why. Also explain the
 concept of external and Internal sorting.
          the array of 4GB, we use the Externa
   Sorting because from size is greater than the RAM
       Vour computer 1
> External sorting: These are sorting algorithms that can
 handle large data amounts which eannot fit in the
 main memory. Therefore only a part of the array resides
in the RAM Uduring execution
           Example: UK-way Merge Sost.
Internal Sorting: These lave sorting algorithms
  whole array needs to be in the
                                      RAM during execution
              Bx: Bubble Sort, Selection Sort etc.
```

Teacher's Sign