Vidyalankar Polytechnic	DEPARTMENT OF COMPUTER ENGINEERING

Subject: - DATA STRUCTURE	**Subject Code:** 313 301
Semester: - III	**Course:** COMPUTER ENGINEERING
Laboratory No: L003	**Name of Subject Teacher:** Prof. Imraan S.
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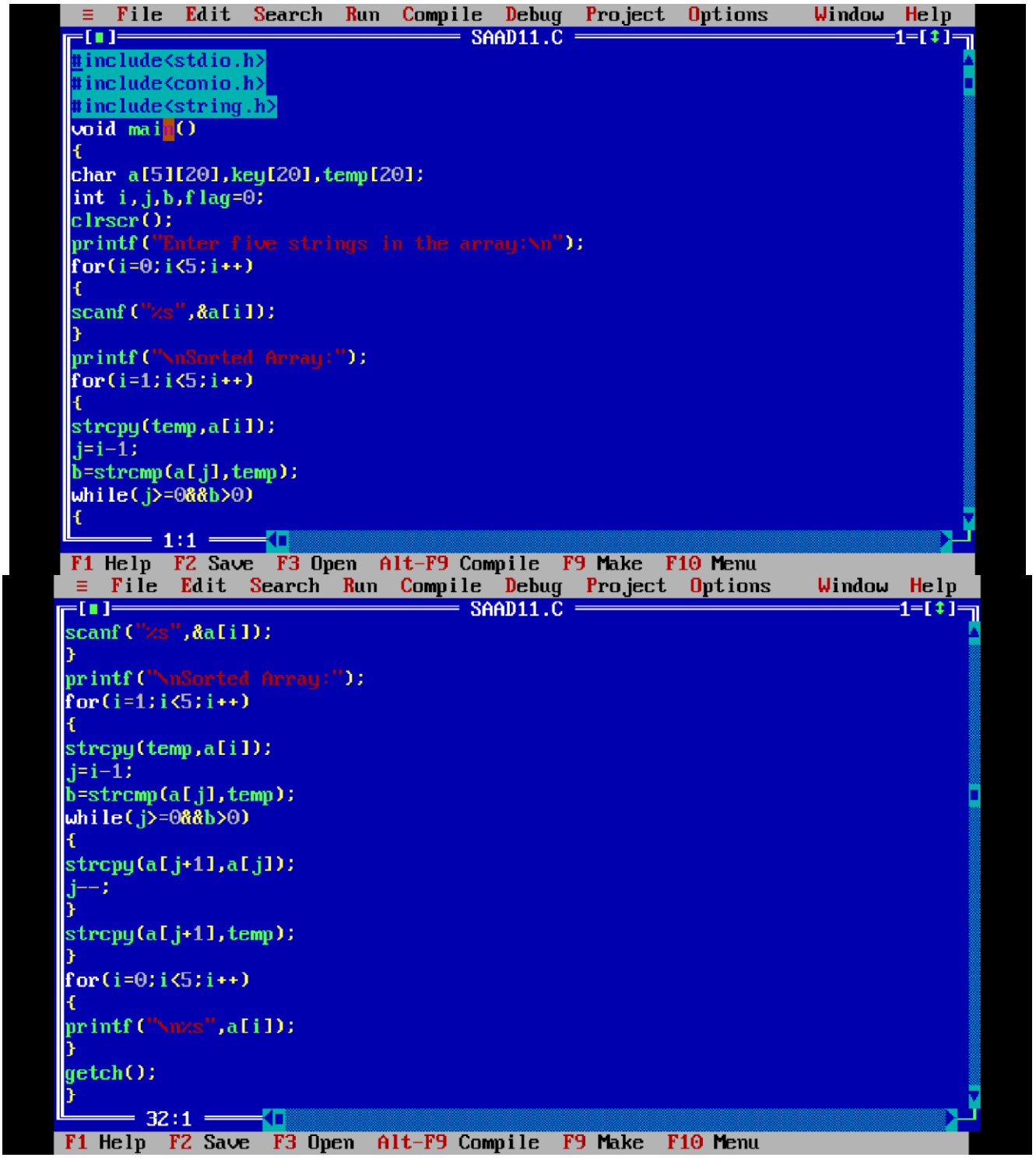
Experiment No:	11
Title of Experiment	* Write a 'C' Program to Sort an Array of Strings using Insertion Sort Method

Aim: Write a 'C' Program to Sort an Array of Strings using Insertion Sort Method.

Algorithm:

Step 1: Start
Step 2: Declare a 2D character array a[5][20], key[20], and temp[20]
Step 3: Declare integer variables i, j, b, and flag = 0
Step 4: Clear screen using clrscr()
Step 5: Print "Enter 5 Strings in the array:"
Step 6: Run a loop from i = 0 to i < 5
Step 6.1: Scan a string and store it in a[i]
Step 7: Print "Sorted Array:"
Step 8: Run a loop from i = 1 to i < 5
Step 8.1: Copy a[i] into temp
Step 8.2: Set j = i - 1
Step 8.3: Compare a[j] and temp using strcmp() and store result in b
Step 8.4: While j >= 0 and b > 0, repeat
Step 8.4.1: Copy a[j] into a[j + 1]
Step 8.4.2: Decrement j by 1
Step 8.5: Copy temp into a[j + 1]
Step 9: Run a loop from i = 0 to i < 5
Step 9.1: Print a[i]
Step 10: Stop

CODE:



```
#include<stdio.h>
#include<conio.h>
#include<string.h>
void main()
{
char a[5][20],key[20],temp[20];
int i,j,b,flag=0;
clrscr();
printf("Enter five strings in the array:\n");
for(i=0;i<5;i++)
{
scanf("%s",&a[i]);
}
printf("\nSorted Array:");
for(i=1;i<5;i++)
{
strcpy(temp,a[i]);
j=i-1;
b=strcmp(a[j],temp);
while(j>=0&&b>0)
{
strcpy(a[j+1],a[j]);
j--;
}
strcpy(a[j+1],temp);
}
for(i=0;i<5;i++)
{
printf("\n%s",a[i]);
}
getch();
}
```

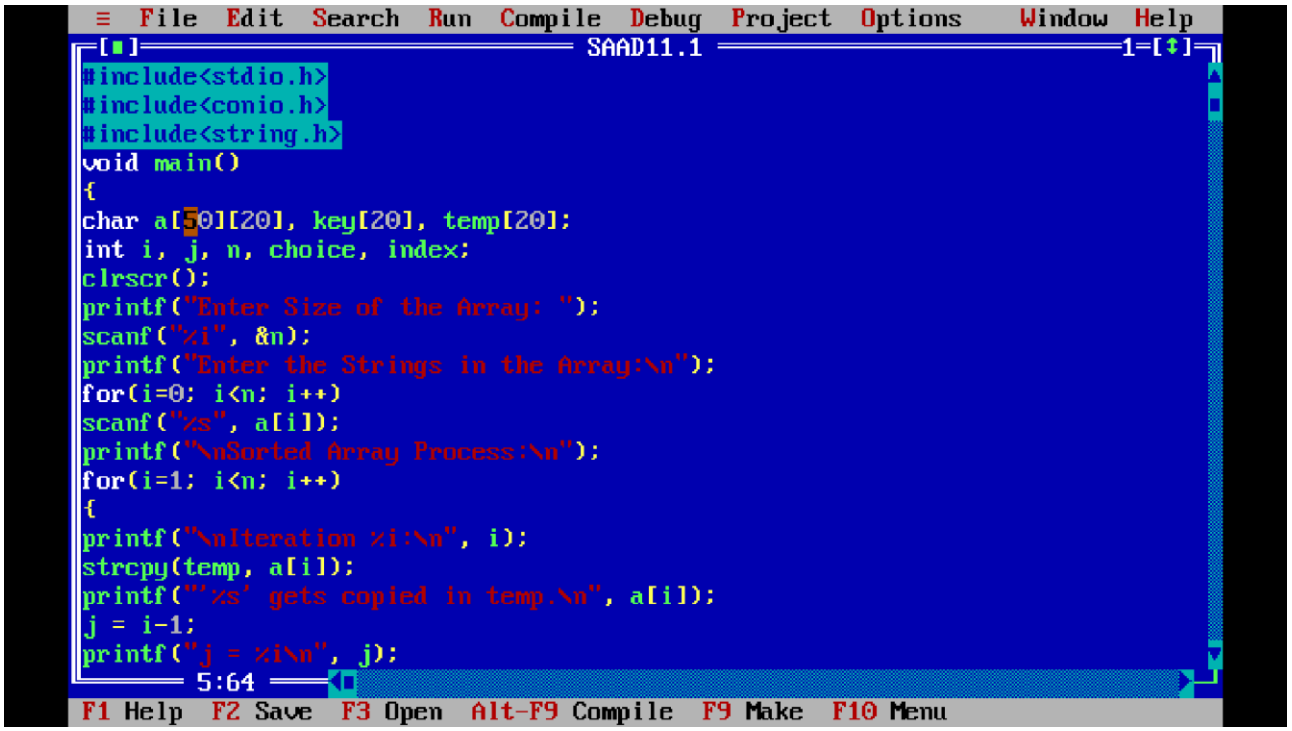
OUTPUT: -

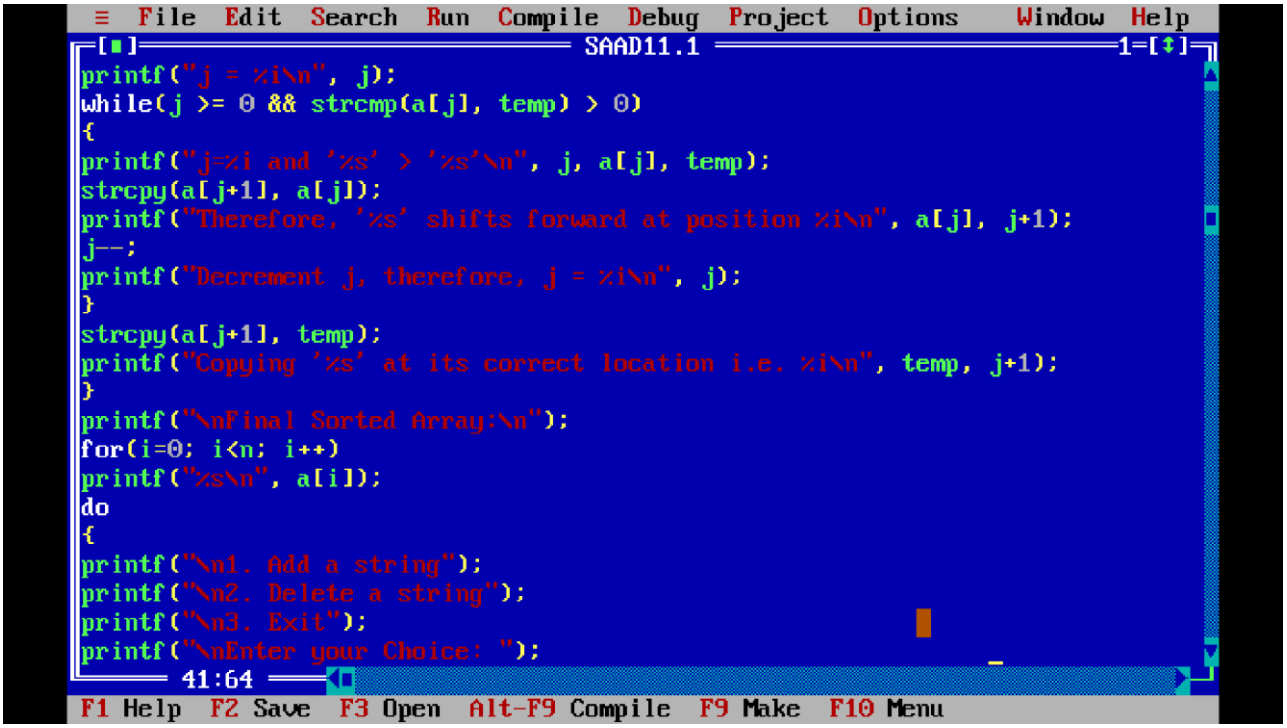

Enter five strings in the array:
bmw
car
audi
grapes
jaguar
Sorted Array:
audi
bmw
car
grapes
jaguar_

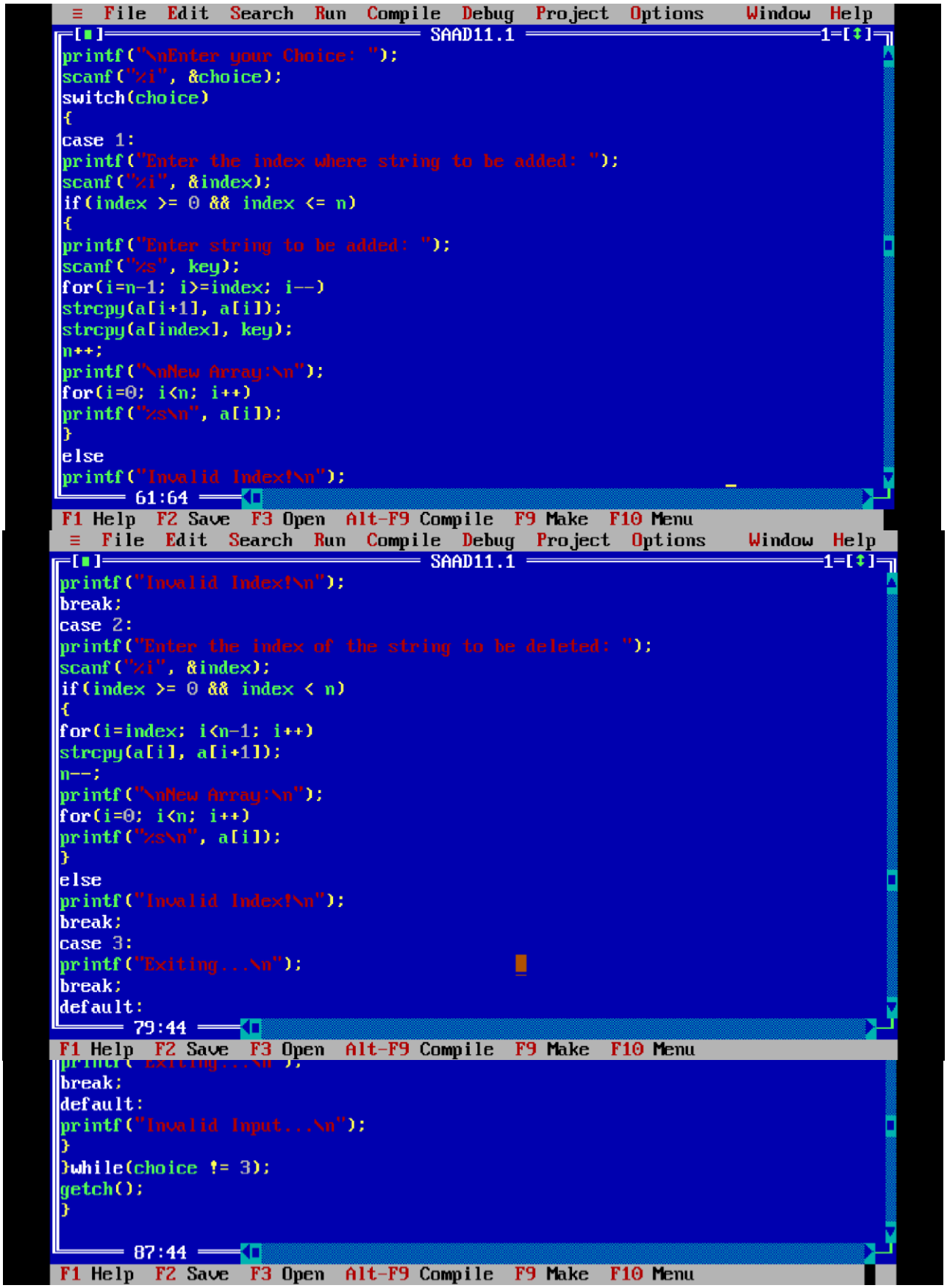
Practical Related Questions

1. **Create an interactive game where the user enters a list of strings, and the program sorts them using insertion sort. Allow the user to add or remove strings dynamically and see the sorting process step by step.**

CODE:






File Edit Search Run Compile Debug Project Options Window Help
SAAD11.1
printf("\nEnter your Choice: ");
scanf("%i", &choice);
switch(choice)
{
case 1:
printf("Enter the index where string to be added: ");
scanf("%i", &index);
if(index >= 0 && index <= n)
{
printf("Enter string to be added: ");
scanf("%s", key);
for(i=n-1; i>=index; i--)
strcpy(a[i+1], a[i]);
strcpy(a[index], key);
n++;
printf("\nNew Array:\n");
for(i=0; i<n; i++)
printf("%s\n", a[i]);
}
else
printf("Invalid Index!\n");
61:64
F1 Help F2 Save F3 Open Alt-F9 Compile F9 Make F10 Menu
File Edit Search Run Compile Debug Project Options Window Help
SAAD11.1
printf("Invalid Index!\n");
break;
case 2:
printf("Enter the index of the string to be deleted: ");
scanf("%i", &index);
if(index >= 0 && index < n)
{
for(i=index; i<n-1; i++)
strcpy(a[i], a[i+1]);
n--;
printf("\nNew Array:\n");
for(i=0; i<n; i++)
printf("%s\n", a[i]);
}
else
printf("Invalid Index!\n");
break;
case 3:
printf("Exiting...\n");
break;
default:
79:44
F1 Help F2 Save F3 Open Alt-F9 Compile F9 Make F10 Menu
break;
default:
printf("Invalid Input...\n");
}
}while(choice != 3);
getch();
}
87:44
F1 Help F2 Save F3 Open Alt-F9 Compile F9 Make F10 Menu

OUTPUT:

```
Iteration 3:
'range' gets copied in temp.
j = 2
Copying 'range' at its correct location i.e. 3

Iteration 4:
'jaguar' gets copied in temp.
j = 3
j=3 and 'range' > 'jaguar'
Therefore, 'range' shifts forward at position 4
Decrement j, therefore, j = 2
Copying 'jaguar' at its correct location i.e. 3

Final Sorted Array:
audi
bmw
cadilac
jaguar
range

1. Add a string
2. Delete a string
3. Exit
Enter your Choice:
Copying 'jaguar' at its correct location i.e. 3

Final Sorted Array:
audi
bmw
cadilac
jaguar
range

1. Add a string
2. Delete a string
3. Exit
Enter your Choice: 2
Enter the index of the string to be deleted: 2

New Array:
audi
bmw
jaguar
range

1. Add a string
2. Delete a string
3. Exit
Enter your Choice: 2
```

```
3. Exit
Enter your Choice: 2
Enter the index of the string to be deleted: 2

New Array:
audi
bmw
jaguar
range

1. Add a string
2. Delete a string
3. Exit
Enter your Choice: 2
Enter the index of the string to be deleted: 2

New Array:
audi
bmw
range

1. Add a string
2. Delete a string
3. Exit
Enter your Choice: 3
```

2. **Implement insertion sort with a custom comparison function that sorts strings based on**

a specific criterion (e.g., number of vowels, number of consonants, etc.).

CODE:

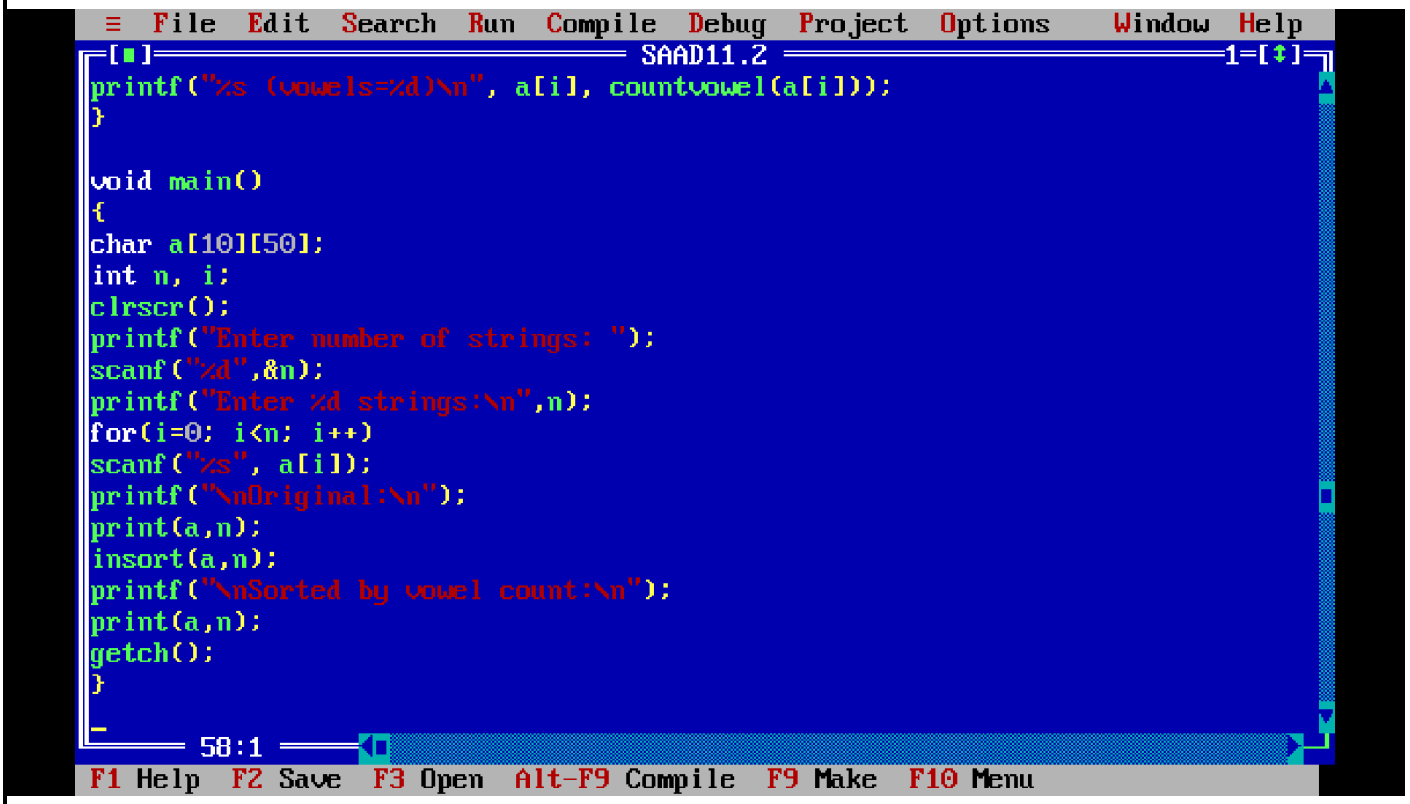
```
 ≡  File  Edit  Search  Run  Compile  Debug  Project  Options    Window  Help
┌─[■]──────────────────────── SAAD11.2 ──────────────────────────1=[↕]─┐
#include<stdio.h>
#include<conio.h>
#include<string.h>

int countvowel(char s[])
{
int i, c=0;
for(i=0; s[i] != '\0'; i++)
{
if(s[i]=='a' || s[i]=='e' || s[i]=='i' || s[i]=='o' || s[i]=='u' ||
   s[i]=='A' || s[i]=='E' || s[i]=='I' || s[i]=='O' || s[i]=='U')
c++;
}
return c;
}

void insort(char a[][50], int n)
{
int i, j;
char key[50];
for(i=1; i<n; i++)
└──────── 1:1 ─────────┘
F1 Help  F2 Save  F3 Open  Alt-F9 Compile  F9 Make  F10 Menu
 ≡  File  Edit  Search  Run  Compile  Debug  Project  Options    Window  Help
┌─[■]──────────────────────── SAAD11.2 ──────────────────────────1=[↕]─┐
for(i=1; i<n; i++)
{
strcpy(key, a[i]);
j=i-1;
while(j>=0 && countvowel(a[j]) > countvowel(key))
{
strcpy(a[j+1], a[j]);
j--;
}
strcpy(a[j+1], key);
}
}

void print(char a[][50], int n)
{
int i;
for(i=0; i<n; i++)
printf("%s (vowels=%d)\n", a[i], countvowel(a[i]));
}

void main()
└──────── 41:1 ─────────┘
F1 Help  F2 Save  F3 Open  Alt-F9 Compile  F9 Make  F10 Menu
```


File Edit Search Run Compile Debug Project Options Window Help
SAAD11.2
printf("%s (vowels=%d)\n", a[i], countvowel(a[i]));
}
void main()
{
char a[10][50];
int n, i;
clrscr();
printf("Enter number of strings: ");
scanf("%d",&n);
printf("Enter %d strings:\n",n);
for(i=0; i<n; i++)
scanf("%s", a[i]);
printf("\nOriginal:\n");
print(a,n);
insort(a,n);
printf("\nSorted by vowel count:\n");
print(a,n);
getch();
}
58:1
F1 Help F2 Save F3 Open Alt-F9 Compile F9 Make F10 Menu

OUTPUT:

```
Enter number of strings: 5
Enter 5 strings:
audi
bmw
range
jaguar
fortuner

Original:
audi (vowels=3)
bmw (vowels=0)
range (vowels=2)
jaguar (vowels=3)
fortuner (vowels=3)

Sorted by vowel count:
bmw (vowels=0)
range (vowels=2)
audi (vowels=3)
jaguar (vowels=3)
fortuner (vowels=3)
_
```

Marks Obtained			Dated signature of Teacher
Process Related (35)	**Product Related(15)**	**Total (50)**	