ASSIGNMENT-12

Write a C Program using Dynamic Memory Allocation for the following problem statements:-

1. To create memory for int, char and float variable at run time.

```
#include<stdio.h>
#include<stdlib.h>
int main()
{
        int   *i;
        char  *c;
        float *f;

        i=(int*)  malloc(sizeof(int));
        c=(char*) malloc(sizeof(char));
        f=(float*)malloc(sizeof(float));

        *i=200;
        *c='N';
        *f=123.45f;

        printf("value of i= %d\n",*i);
        printf("value of c= %c\n",*c);
        printf("value of f= %f\n",*f);

        free(i);
        free(c);
        free(f);

        return 0;
}
```

Output:-

```
value of i= 200
value of c= N
value of f= 123.449997
```

2. to input and print text using Dynamic Memory Allocation

```
#include <stdio.h>
#include <stdlib.h>

int main()
{
   int n;
   char *text;

   printf("Enter limit of the text: ");
   scanf("%d",&n);

   /*allocate memory dynamically*/
   text=(char*)malloc(n*sizeof(char));
```

```
    printf("Enter text: ");
    scanf(" ");
    gets(text);

    printf("Inputted text is: %s\n",text);
    free(text);

    return 0;
}
```

Output:-

```
Enter limit of the text: 200
Enter text: wap in c to input and print text using dynamic meory allocation
Inputted text is: wap in c to input and print text using dynamic meory allocation
```

3. To read a one dimensional array, print sum of all elements along with inputted array elements using Dynamic Memory Allocation.

```
#include <stdio.h>
#include <stdlib.h>
 int main()
{
    int *arr,limit,i,sum=0;
    printf("Enter number of elements: ");
    scanf("%d",&limit);
    arr=(int*)malloc(limit*sizeof(int));

    if(arr==NULL)
    {
        printf("Insufficient Memory...\n");
        return 0;
    }

    printf("Enter %d elements:\n",limit);
    for(i=0; i<limit; i++)
    {
        printf("Enter element %3d: ",i+1);
        scanf("%d",(arr+i));
        sum=sum + *(arr+i);
    }
    printf("Array elements are:");
    for(i=0; i<limit; i++)
        printf("%3d ",*(arr+i));


    printf("\nSum of all elements: %d\n",sum);

    return 0;
}
```

Output:-

```
Enter number of elements: 4
Enter 4 elements:
Enter element   1: 21
Enter element   2: 34
Enter element   3: 12
Enter element   4: 15
Array elements are: 21  34  12  15
Sum of all elements: 82
```

4. To read and print the student details using structure and Dynamic Memory Allocation.

```
#include <stdio.h>
#include <stdlib.h>
struct course
{
   int marks;
   char subject[30];
};

int main()
{
   struct course *ptr;
   int i, no_of_rec;
   printf("Enter the number of records: ");
   scanf("%d", &no_of_rec);

   ptr = (struct course *)malloc(no_of_rec * sizeof(struct course));
   for (i = 0; i < no_of_rec; ++i)
   {
      printf("Enter the name of the subject and marks :\n");
      scanf("%s %d", (ptr + i)->subject, &(ptr + i)->marks);
   }

   printf("Displaying Information:\n");
   for (i = 0; i < no_of_rec; ++i)
      printf("%s\t%d\n", (ptr + i)->subject, (ptr + i)->marks);

   return 0;
}
```

Output:-

```
Enter the number of records: 2
Enter the name of the subject and marks :
DMS 89
Enter the name of the subject and marks :
C 60
Displaying Information:
DMS     89
C       60
```

5. To find sum of N elements entered by user. To perform this program, allocate memory dynamically using malloc() function.

```
#include<stdio.h>
#include<stdlib.h>
void main()
{
int *p,i,num,sum=0;
```

```
printf("Enter the elements size:\n ");
scanf("%d",&num);
p=(int *)malloc(num * sizeof(int));
printf("Enter the array values: \n");
for(i=0;i<num;i++)
scanf("%d",p+i);
for(i=0;i<num;i++)
{
sum = sum + *p;
p++;
}
printf("\nThe sum of elements is: %d\n",sum);
}
```

Output:-

```
Enter the elements size:
 3
Enter the array values:
2
7
6

The sum of elements is: 15
```

6. To find Largest of N Numbers. To perform this program, allocate memory dynamically using calloc() and realloc() function.

```
#include <stdio.h>
#include <stdlib.h>
int main()
{
   int num;
   int *data;
   printf("Enter the number of elements: ");
   scanf("%d", &num);
   data = (int *)calloc(num, sizeof(float));
   if (data == NULL) {
      printf("Error!!! memory not allocated.");
      exit(0);
   }

   for (int i = 0; i < num; ++i) {
      printf("Enter Number %d: ", i + 1);
      scanf("%d", data + i);
   }

   for (int i = 1; i < num; ++i)
   {
      if (*data < *(data + i))
         *data = *(data + i);
   }
   printf("Largest number = %d", *data);

   return 0;
}
```

Output:-

```
Enter the number of elements: 5
Enter Number 1: 23
Enter Number 2: 12
Enter Number 3: 90
Enter Number 4: 45
Enter Number 5: 34
Largest number = 90
```

Write a C Program using Pre-processors for the following problem statements:-

7. Display all prime numbers between two Intervals

8. Check Prime and Armstrong Number by making function

```
#define NUM 153
void main()
{
#ifdef NUM prime(NUM); armstrong(NUM);
#endif // NUM
}
void prime(int n)
{
int i;
for(i=2; i<n; i++)
if(n%2==0) break;
if(i==n)
printf("%d is prime\n",n);
else
printf("%d is not prime\n",n);
}
void armstrong(int n)
{
int r,num,t;
t=n;
while(n)
num=num+(pow((n%10),3));
n=n/10;
}
if(num==t)
printf("%d is armstrong",num);
 else
printf("%d is not a armstrong number ",t);
}
```

9. Define a preprocessor macro swap(t, x, y) that will swap two arguments x and y of a given type t

```
#include<stdio.h>
#include<conio.h>
#define SWAPE(x,y) int t;t=x;x=y;y=t;
main()
{
        int a,b;

        printf("\n Enter two number");
        scanf("%d%d",&a,&b);
```

```
        printf("\n Before swaping the Value of a=%d and b=%d",a,b);
        SWAPE(a,b);
        printf("\n After swap value of a=%d and b=%d",a,b);
        return 0;
}
```

Output:-