Question # 1 **[40 points (4 each), 70 mins]**
CLO1

. Considering the following programs and illustrate the required process in graphical form. Assume all necessary header files are included and all programs are syntactically correct.

. **Illustrate a memory allocation for both type of dynamic memory allocation.**

```
void main()
 {
double *ptr1,*ptr2;
ptr1=(double*)malloc(5 * sizeof(double));
ptr2=(double*)calloc(5 , sizeof(double));}
```

Show dummy addresses and garbage values to highlight the difference.

Note: GB stands for Grabbage Value

Variable	**ptr1+0**	**ptr1+1**	**ptr1+2**	**ptr1+3**	**ptr1+4**
Address	1000	1008	1016	1024	1032
Value	GB	GB	GB	GB	GB
Variable	**ptr2+0**	**ptr2+1**	**ptr2+2**	**ptr2+3**	**ptr2+4**
Address	2000	2008	2016	2024	2032
Value	0	0	0	0	0

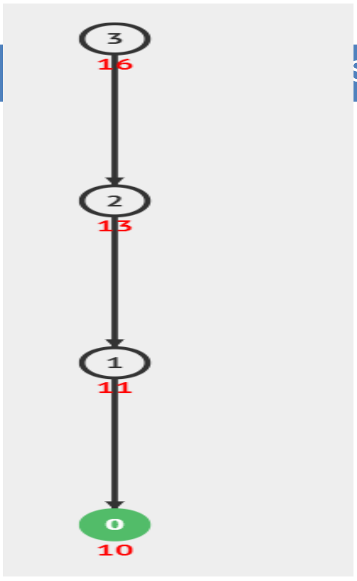
SOLUTION

b. Draw the recursive stack of the following function, if we call sum(3) with n = 3.

```
int sum( int n)
   {
      if (n==0)
       return 10;
      else
       return n + sum(n-1);

   }
```

returns 16



c. Draw the recursive stack of the following function, if we call fibonacci(3) with n = 3.

```
int fibonacci(int n)
{
    if (n==0)
        return 0;
    else if (n==1)
        return 1;
    else
  return fibonacci(n-2) + fibonacci(n-1);}
```

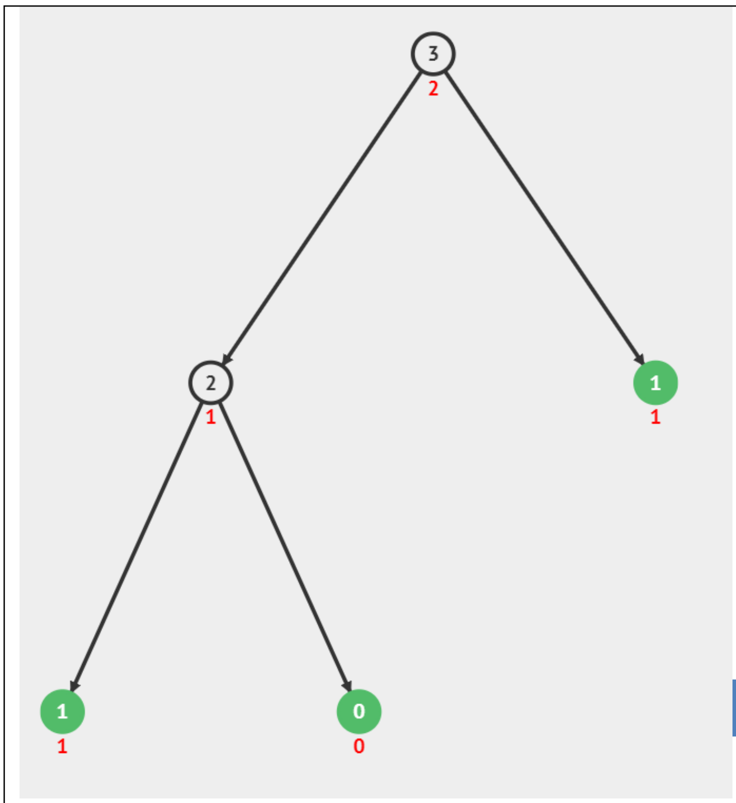
```
Solution:
Returns 2
Mentioned Below
```

d. Illustrate a memory allocation for the following structure object student1.

```
struct day{
  int date;char month[10];int
year;};
struct student{
 int id1, id2;
 char a; float p;
 struct day birthday;
   }student1;
```

Assume starting address as 1020

id1: 1020
id2: 1024



a: 1028
p:1032
date:1036
month:1040
year:1052

B. Considering the output, write down the missing part of the program. You must write only the missing part on the answer sheet with the most appropriate code. **CLO2**

```
.

#include <stdio.h>
typedef struct{
 int id; float price; char name[20];
}userTyped;
void main() {
userTyped inst1[]={{20, 5000.05,"Samsung"},
                   {30, 3300.25, "Apple"},
                   {40, 6020.05, "Acer"}};
 userTyped *ptr = inst1;
    //Using variable
    for(_______;_______;_______)
        ________________________
    printf("------------\n");
    //Using pointer
    for(_______;_______;_______)
        {  ________________________
           ________________________
        }}
```

SOlution:

```
#include <stdio.h>
typedef struct{
 int id; float price; char name[20];
}userTyped;
void main() {
userTyped inst1[]={{20, 5000.05,"Samsung"},
                   {30, 3300.25, "Apple"},
                   {40, 6020.05, "Acer"}};
```

Output:

```
40, 6020.0, Acer
30, 3300.2, Apple
20, 5000.0, Samsung
------------
20, 5000.0, Samsung
30, 3300.2, Apple
40, 6020.0, Acer
```

```
 userTyped *ptr = inst1;
    //Using variable
    int i;
    for(i = 2;i >=0;i--)
        printf("%d %f %s\n", inst1[i].id,
inst1[i].price, inst1[i].name);
    printf("------------\n");
    //Using pointer
    for(i = 0;i <= 2;i++)
        {
             printf("%d %f %s\n", (ptr+i)->id,
(ptr+i)->price, (ptr+i)->name);
        }}
```

b.

```
void main(){
char country[] = "Pakistan";
void *ptr;
ptr = country;
while( ___________________)
  {    __________________
       __________________
   }}
```

SOlution:

```
#include<stdio.h>

int main(){
char country[] = "Pakistan";
void *ptr;
ptr = country;
while( *((char*)(ptr)) != '\0')
  {
  printf("%c", *((char*)(ptr)));
  ptr++;
   }}
```

Output:
Pakistan

c.

```
void main(){
 char ch, *str;
 int cnt=0;
 puts("enter any string: ");
 while((ch=getche()) != 13){
   if(cnt==0){
 str = (char *) malloc (sizeof(char));
 str[cnt]=ch;}
   else{
___________________________________
___________________________________
}
       _____________}
 str[cnt]='\0';
 printf("\n%s",str);
}
//Hint: You need to extend the dynamic array in
this problem
```

Solution:

```
#include<stdio.h>
#include<stdlib.h>
int main(){
 char ch, *str;
```

Output:
It will produce **"Pakistan Zindabad"** if input is **"Pakistan Zindabad"**

```
 int cnt=0;
 puts("enter any string: ");
 while((ch=getche()) != 13){
   if(cnt==0){
 str = (char *) malloc (sizeof(char));
 str[cnt]=ch;}
   else{
       str = (char*) realloc(str,
(cnt+2)*sizeof(char));
       str[cnt] = ch;

       }
       cnt++;
       }
 str[cnt]='\0';
 printf("\n%s",str);
}
```

d. Initialize and display the record structure:

```
struct employee{
    int eid;  char ename[20];
};
struct date{
   int joiningYear;};
struct record{
  struct employee emp;    struct date dt;
};
void main(){
       struct record rcd[2]={
              { ______________,
                ______________
       };
      ______________
      ______________
}}
```

Solution:

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

struct employee{
    int eid;  char ename[20];
};
struct date{
   int joiningYear;};
struct record{
  struct employee emp;    struct date dt;
};
void main(){
       struct record rcd[2]={
              {{101,"Asad"}, 2010},
                {{102,"Bilal"}, 2014}};
    int i;
    for(i  = 0; i <2; i++){
       printf("Employee ID: %d \nName: %s
\nJoining Year: %d\n\n", rcd[i].emp.eid,
rcd[i].emp.ename, rcd[i].dt.joiningYear);
       }
}
```

Output:

```
Employee ID:101
Name: Asad
Joining Year: 2010

Employee ID: 102
Name: Bilal
Joining Year: 2014
```

e.

```
void main() {
```

Output:

```
P
PR
```

```
int arrAll[]={80, 82, 79, 71, 82, 65, 77};
  for(_______; ______; ________)
      {
       for(_______; ______; ________)
           ____________________
           ____________________
       }
    }

    Solution:

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



    int main() {
        int i,j;
    int arrAll[]={80, 82, 79, 71, 82, 65, 77};
      for(i = 0; i < 7; i++)
      {
       for(j = 0; j <= i; j++)
           printf("%c", arrAll[j]);

       puts("");}
    }
```

```
PRO
PROG
PROGR
PROGRA
PROGRAM
```

```
f.

void main(void){
 char *p[3] = {"Rashid", "Sajid", "Ali",};
 char * tmp; int i, j;
  for( i = 0; i<3; i++)
     for( _____; _____; _____)
      { ________________
        { ________________
        }
      }_______________
       _______________
}
```

Solution:

```
int main(void){
        char *p[3] = {"Rashid", "Sajid", "Ali",};
        char  tmp[20]; int i, j;
        for(i=0; i<3; i++){
  for(j=0; j<3-1-i; j++){
    if(strcmp(p[j], p[j+1]) > 0){
     //swap array[j] and array[j+1]
     strcpy(tmp, p[j]);
     strcpy(p[j], p[j+1]);
     strcpy(p[j+1], tmp);
    }
  }
 }
        for( i = 0; i<3; i++)
                puts(p[i]);
```

Output:

```
Ali
Rashid
Sajid
```

}	

QUESTION:2 SOLUTION:

```
#include<stdio.h>
int lighten(int image[3][3], int row, int col){
        int rowCtr, colCtr;
        for (rowCtr = 0; rowCtr < row; rowCtr++){
                for(colCtr = 0; colCtr < col; colCtr++){
                                image[rowCtr][colCtr] *= 1.10;
                                if(!(image[rowCtr][colCtr] >= 0 &&
image[rowCtr][colCtr] <= 255))
                                        return 1;
                }
        }
        return 0;
}
void display(int image[3][3], int row, int col){
        puts("\nDisplaying the matrix after lightening");
        int rowCtr, colCtr;
        for (rowCtr = 0; rowCtr < row; rowCtr++){
                for(colCtr = 0; colCtr < col; colCtr++){
                        printf("%d ", image[rowCtr][colCtr]);
                }
                puts("");
        }

}

int main(){
        int row, col, rowCtr, colCtr;
        puts("Enter the number of rows and cols");
        scanf("%d %d", &row, &col);
        int image[row][col];
        for (rowCtr = 0; rowCtr < row; rowCtr++){
                for(colCtr = 0; colCtr < col; colCtr++){
                        do{
                                printf("Enter the row %d and col %d : \n",
rowCtr, colCtr);
                                scanf("%d", &image[rowCtr][colCtr]);
                        }
                        while(!(image[rowCtr][colCtr] >= 0 &&
image[rowCtr][colCtr] <= 255));
                }
        }
        if(lighten(image, row, col))
                puts("Image is burnt out");
        else
                display(image, row, col);
}
```

QUESTION:3 SOLUTION:

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


        struct CustomerInfo{
                char CustomerName[50];
                char AddressName[50];
        };

        struct Car {
                int Price;
                int Model;
                char Brand[50];
                char ManufacturingDate[50];
                char CountryOfOrigin[50];
                struct CustomerInfo CI;
        };
```

```
        void printline() {
                printf("\t------------------------------------------\n");
        }

        long ServicesTax(int Price) {
                return (Price * 75) / 100;
        }

        long RetailProfit(int Price) {
                return (Price * 75) / 100;
        }

        long importDutyTax(int Price) {
                return (Price * 15) / 100;
        }

        long SalesTax(int Price) {
                return 10 * Price/ 100;
        }

        long CalulatePrice(int Price) {
                long temp = SalesTax(Price) + ServicesTax(Price) + RetailProfit(Price) +
importDutyTax(Price);
                temp += Price;
                return temp;
        }

        void PrintAllDetails(struct Car c) {
```

```
		printline();
		printf("\t\tBILLING DETAILS \n");
		printline();
		printf("\tImport Duty Cost: \tRs %ld \n",importDutyTax(c.Price));
		printf("\tSales Tax Cost: \tRs %ld \n",SalesTax(c.Price));
		printf("\tRetail Price: \t\tRs %ld \n",RetailProfit(c.Price));
		printline();
		printf("\tFinal Price: \t\tRs %ld \n",CalulatePrice(c.Price));
		printf("\t********THANKYOU FOR SHOPPING. **********\n\n\n");
	}

	void printBill(int model){
		struct Car c;
		FILE *fptr = fopen("bill.txt","r");
		if(fptr == NULL){
			printf("Could not open file!");
		}
```

```
		else{
			while(fread(&c, sizeof(struct Car), 1, fptr)){

				if(c.Model == model){

					printf("\t\tEnter CUSTOMER INFORMATION \n");
					printline();

					printf("\t\tCustomer Name: %s\n",
c.CI.CustomerName);
					printf("\t\tCustomer Address: %s\n",
c.CI.AddressName);
					printf("\t\tCard Brand: %s\n", c.Brand);
					printf("\t\tCard Model: %d\n", c.Model);
					printf("\t\tCar price: %d\n", c.Price);
					printf("\t\tCountry of Origin: %s\n",
c.CountryOfOrigin);
					printf("\t\tCar Manufacturing Date:
%s\n",c.ManufacturingDate);


					PrintAllDetails(c);
			}

			}
			fclose(fptr);
		}

	}
```

```
void SaveBillInfo(){
        struct Car c;
        puts("\t\tEnter Customer Name!");
        printf("\t\t");
        fflush(stdin);
        scanf("%s", c.CI.AddressName);
        puts("\t\tEnter Customer addres!");
        printf("\t\t");
        scanf("%s", c.CI.AddressName);
        puts("\t\tEnter the price of Car!");
        printf("\t\t");
        scanf("%d", &c.Price);
        puts("\t\tEnter the Model of Car!");
        printf("\t\t");
        scanf("%d", &c.Model);
        puts("\t\tEnter the brand of car");
        printf("\t\t");
        fflush(stdin);
        scanf("%s", c.Brand);
        puts("\t\tEnter Manufacturing date of the car");
        printf("\t\t");
        scanf("%s", c.ManufacturingDate);
        puts("\t\tEnter country of origin of the car!");
        printf("\t\t");
        scanf("%s", c.CountryOfOrigin);

        FILE *fptr = fopen("bill.txt","a");
        if(fptr == NULL){
                printf("Could not open file!");
        }
        else{
                fwrite(&c, sizeof(struct Car), 1, fptr);
                fclose(fptr);
        }
}
void GetBillInfo(){
        struct Car c;
        FILE *fptr = fopen("bill.txt","r");
        if(fptr == NULL){
                printf("Could not open file!");
        }
        else{
                while(fread(&c, sizeof(struct Car), 1, fptr)){

                        printf("\t\tCustomer Name: %s\n", c.CI.CustomerName);
                        printf("\t\tCustomer Address: %s\n", c.CI.AddressName);
                        printf("\t\tCard Brand: %s\n", c.Brand);
                        printf("\t\tCard Model: %d\n", c.Model);
                        printf("\t\tCar price: %d\n", c.Price);
                        printf("\t\tCountry of Origin: %s\n", c.CountryOfOrigin);
                        printf("\t\tCar Manufacturing Date:
%s\n",c.ManufacturingDate);
                    }
                    fclose(fptr);
            }


    }


    int main(){
            int choice =0;
            outFile = fopen("Car.dat", "w+");
            do{
                    printf("\n\n\tENTER CHOICE\n \t1.Save to Bill Details\n\t2.Get Bill
Details\n\t3.Print All with taxes of perticular car\n");
                    printf("\tMake a choice: ");
                    fflush(stdin);
                    scanf("%d",&choice);

                    //printf("\n\n\n Checking %d \n\n\n",choice);
                    system("CLS");

                    if(choice==1){
                            //system("CLS");
                            SaveBillInfo();
                    } else if(choice==2){
                            GetBillInfo();
                    } else if (choice==3){
                            int model;
                            puts("\t\tEnter the Model No. for car");
                            printf("\t\t");
                            scanf("%d", &model);
                            printBill(model);
                            }
            }while(choice!=0);
            return 0;
    }
```

QUESTION:4SOLUTION:

```
#include<stdio.h>
#include<stdlib.h>
struct group{
        int groupID;
        char groupName[20];
        int tasks[5];
};
int sum(int * arr){
        int i; int sum = 0;
        for(i  = 0; i < 5; i++)
                sum += arr[i];
        return sum;
}
void diplayWinner(){
        struct group gp;
        int groupCtr = 1;
        FILE *fp = fopen("CompRecord1.txt","r");
        if(fp == NULL){
                puts("File Did not open!");
                return;
        }
        else{
                // reading the records
                while(fread(&gp, sizeof(struct group), 1, fp)){
                        if(sum(gp.tasks) >= 3){
                                printf("\n\nWinner Group Details %d are\n\n", groupCtr);
                                printf("Group ID : %d\nGroup Name : %s\n", gp.groupID,
gp.groupName);
                                puts("");
                                groupCtr++;
                                }
                }
                fclose(fp);
        }
}
void search(){
        int ID, counter, isFound = 0;
        FILE *fp = fopen("CompRecord1.txt","r");
        if(fp == NULL){
                puts("File Did not open!");
                return;
        }
        puts("Enter the Group ID you want to search!");
        scanf("%d", &ID);
        else{
                struct group gp;
                // reading the records
                while(fread(&gp, sizeof(struct group), 1, fp)){
                        if(gp.groupID == ID){
                                puts("\n\nGroup Details are\n");
```

```
                                        printf("Group ID : %d\nGroup Name : %s\n", gp.groupID,
gp.groupName);
                                        puts("Task status is ");
                                        for(counter = 0; counter < 5; counter++){
                                                printf("Task %d : %d \n",counter+1, gp.tasks[counter]);
                                        }
                                        isFound = 1;
                                }
                        }
                        if(isFound == 0)
                                puts("ID not Found");
                        fclose(fp);
                }
}
void input(){
        struct group gp;
        int ctr;
        puts("Enter Group ID");
        scanf("%d", &gp.groupID);
        fflush(stdin);
        puts("Enter Group Name");
        scanf("%s", gp.groupName);
        puts("Enter the results of tasks 1 for pass o for fail");
        for(ctr = 0; ctr <5; ctr++){
                printf("Enter value of Task %d :", ctr+1 );
                scanf("%d", &gp.tasks[ctr]);
                if(gp.tasks[ctr] != 1 && gp.tasks[ctr] != 0){
                        puts("Re-Enter the value either 0 or 1");
                        ctr--;
                }
        }
        FILE *fp = fopen("CompRecord1.txt","a");
        if(fp == NULL){
                puts("File Did not open!");
                return;
        }
        else{
                fwrite(&gp, sizeof(gp), 1, fp);
                fclose(fp);
        }
}
int main(){
//      remove("CompRecord1.txt");
        char choice = 'Y';
        int op;
        while(choice == 'Y' || choice == 'y'){
                puts("Enter 1 to input the record\nEnter 2 to Display Winner\nEnter 3 to search");
                scanf("%d", &op);
                        switch(op){
                                case 1:
                                        input();
                                        break;
                                case 2:
                                        diplayWinner();
                                        break;
                                case 3:
                                        search();
                                        break;
                                default:
                                        puts("Invalid Value");
                        }
                        puts("Enter Y to Continue!! Press any key to exit");
                        fflush(stdin);
                        scanf("%c", &choice);
        }

}
```