INDIRA GANDHI NATIONAL OPEN UNIVERSITY

LABORATORY RECORD

Month &Year : .....

Name : .....

Study Center : 1402, SH College, Thevara, Kochi-13

Course : .....

Course Title : .....

.....

Course Code: .....

Enrolment No: .....

External Examiner Staff In-Charge

MCSL216 (PART I)

Ques 1:

Implement Fractional Knapsack algorithm and find out optimal result for the problem instance given below:

(P1, P2, P3, P4, Ps) = (20, 30, 40, 32, 55) (W1, W2, W3, W4, Ws) = (5, 8, 10, 12, 15) Given Maximum Knapsack capacity = 20

Source Code

```
#include<stdio.h>
#include<stdlib.h>
int w[10], p[10], v[10][10], n, i, j, cap, x[10] = {0};
int max(int i, int j) {
   return ((i > j) ? i : j);
}
int knap(int i, int j) {
   int value;
   if (v[i][j] < 0) {
      if (j < w[i])
         value = knap(i - 1, j);
      else
         value = max(knap(i - 1, j), p[i] + knap(i - 1, j - w[i]));
      v[i][j] = value;
   }
   return v[i][j];
}

int main() {
   int profit, count = 0;
   printf("\nEnter the number of elements\n");
```

```
scanf("%d", &n);
printf("Enter the profit and weights of the elements\n");
for (i = 1; i <= n; i++) {
   printf("For item no %d\n", i);
   scanf("%d%d", &p[i], &w[i]);
}

printf("\nEnter the capacity \n");
scanf("%d", &cap);
for (i = 0; i <= n; i++)
   for (j = 0; j <= cap; j++)
      if ((i == 0) || (j == 0))
         v[i][j] = 0;
      else
         v[i][j] = -1;

profit = knap(n, cap);
i = n;
j = cap;
while (j != 0 && i != 0) {
   if (v[i][j] != v[i - 1][j]) {
      x[i] = 1;
      j = j - w[i];
      i--;
   } else
      i--;
}

printf("Items included are\n");
printf("Sl.no\tweight\tprofit\n");
for (i = 1; i <= n; i++)
```

```
        if (x[i])
            printf("%d\t%d\t%d\n", ++count, w[i], p[i]);
    printf("Total profit = %d\n", profit);
    // Clear the screen (Windows)
    system("cls");
    // Clear the screen (Unix-like)
    // system("clear");
    return 0;
}
```

Output

```
Output                                                    Clear
/tmp/dvLThYsohN.o
Enter the number of elements
5
Enter the profit and weights of the elements
For item no 1
20
5
For item no 2
30
8
For item no 3
40
10
For item no 4
32
12
For item no 5
55
15
Enter the capacity
20
Items included are
Sl.no   weight  profit
1   5   20
2   15  55
Total profit = 75
```

Ques 2

Implement multiplication of two matrices A[4, 4] and B[4, 4] and calculate following: (i) How many times the innermost and the outermost loop will run? (ii) Total number of multiplication and additions in computing the multiplication of given matrices.

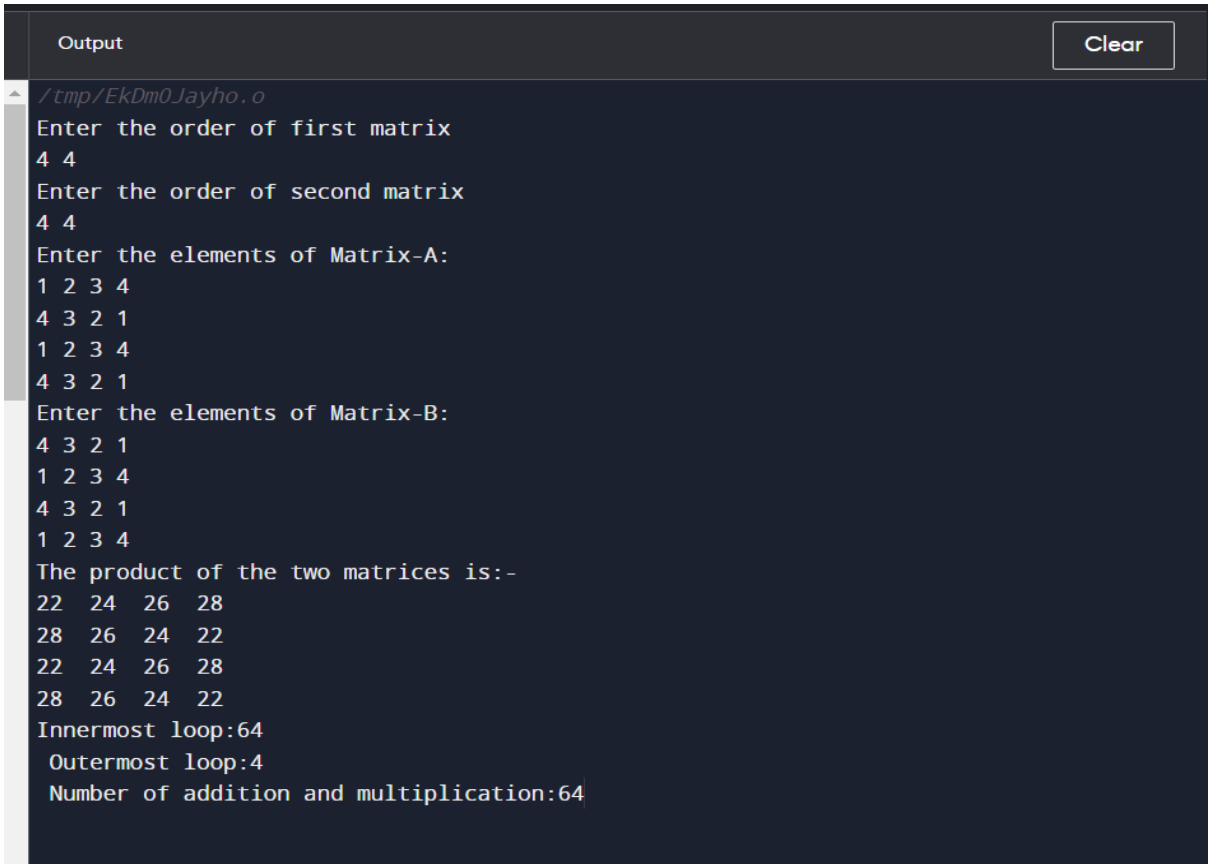
Source Code

```
#include<stdio.h>
int main()
{
   int m, n, p, q, i, j, k;
   int a[10][10], b[10][10], res[10][10];

   printf("Enter the order of first matrix\n");
   scanf("%d%d", & m, & n);
   printf("Enter the order of second matrix\n");
   scanf("%d%d", & p, & q);

   if (n != p)
    {
          printf("Matrix is incompatible for multiplication\n");
     }
    else
    {
      printf("Enter the elements of Matrix-A:\n");
      for (i = 0; i < m; i++)
       {
         for (j = 0; j < n; j++)
         {
            scanf("%d", & a[i][j]);
         }
```

```
}

printf("Enter the elements of Matrix-B:\n");
for (i = 0; i < p; i++)
 {
   for (j = 0; j < q; j++)
   {
      scanf("%d", & b[i][j]);
   }
}
int outer=0,inner=0,count=0;
for (i = 0; i < m; i++)
{
   outer++;
   for (j = 0; j < q; j++)
   {
      res[i][j] = 0;
      for (k = 0; k < p; k++)
      {
         res[i][j] += a[i][k] * b[k][j];
         count++;
         inner++;
      }
   }
}

printf("The product of the two matrices is:-\n");

for (i = 0; i < m; i++)
 {
   for (j = 0; j < q; j++)
```

```
        {
            printf("%d\t", res[i][j]);
        }
        printf("\n");
    }
    printf("Innermost loop:%d \n Outermost loop:%d \n Number of addition and multiplication:%d",inner,outer,count);
}

return 0;
}
```

Output



Ques 3:

Implement Huffman's coding algorithm and run on the problem instance given below:

Letters: A B I M S X Z

Frequency: 10 7 15 8 10 5 2

Source Code

```
#include <iostream>
#include <vector>
#include <queue>
#include <string>

using namespace std;

class Huffman_Codes
{
 struct New_Node
 {
  char data;
  size_t freq;
  New_Node* left;
  New_Node* right;
  New_Node(char data, size_t freq) : data(data),
   freq(freq),
left(NULL),
right(NULL)
                          {}
 ~New_Node()
 {
```

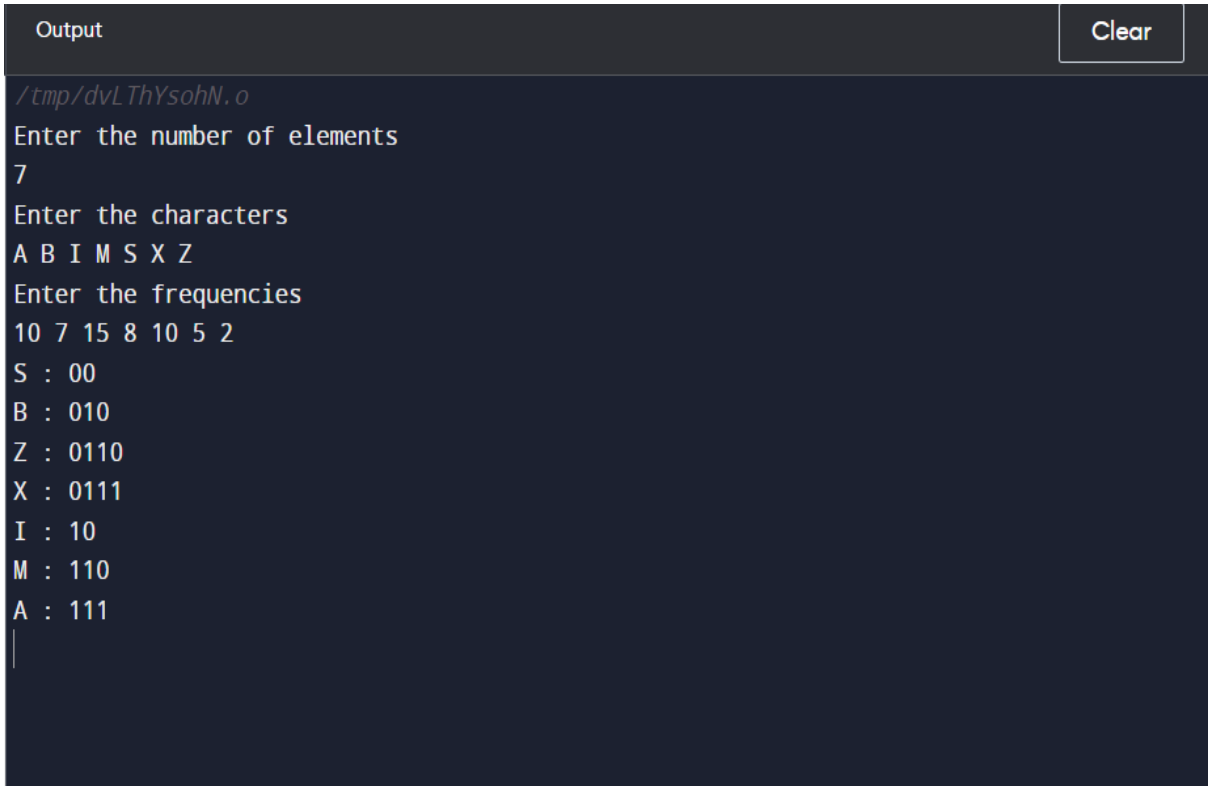
```
  delete left;
  delete right;
 }
 };



 struct compare
 {
  bool operator()(New_Node* l, New_Node* r)
  {
    return (l->freq > r->freq);
  }
};

New_Node* top;

void print_Code(New_Node* root, string str)
{
if(root == NULL)
  return;

 if(root->data == '$')
 {
  print_Code(root->left, str + "0");
  print_Code(root->right, str + "1");
 }

 if(root->data != '$')
 {
   cout << root->data <<" : " << str << "\n";
```

```
   print_Code(root->left, str + "0");
   print_Code(root->right, str + "1");
 }
}


public:
  Huffman_Codes() {};
  ~Huffman_Codes()
  {
    delete top;
  }
  void Generate_Huffman_tree(vector<char>& data, vector<size_t>& freq, size_t size)
  {
   New_Node* left;
   New_Node* right;
   priority_queue<New_Node*, vector<New_Node*>, compare > minHeap;

for(size_t i = 0; i < size; ++i)
   {
     minHeap.push(new New_Node(data[i], freq[i]));
   }

while(minHeap.size() != 1)
    {
     left = minHeap.top();
minHeap.pop();

     right = minHeap.top();
minHeap.pop();
```

```
      top = new New_Node('$', left->freq + right->freq);
      top->left  = left;
      top->right = right;
      minHeap.push(top);
     }
    print_Code(minHeap.top(), "");
 }
};

int main()
 {
  int n, f;
  char ch;
  Huffman_Codes set1;
  vector<char> data;
  vector<size_t> freq;
  cout<<"Enter the number of elements \n";
  cin>>n;
  cout<<"Enter the characters \n";

  for (int i=0;i<n;i++)
  {
     cin>>ch;
data.insert(data.end(), ch);
  }
  cout<<"Enter the frequencies \n";

  for (int i=0;i<n;i++)
  {
     cin>>f;
freq.insert(freq.end(), f);
```

```
  }
  size_t size = data.size();
  set1.Generate_Huffman_tree(data, freq, size);
  return 0;
}
```

OUTPUT 3



Ques 4

Implement Selection sort algorithm to sort the following list of numbers

55, 25, 15, 40, 60, 35, 17, 65, 75, 10

Calculate the following:

(i) Number of exchange operations performed.

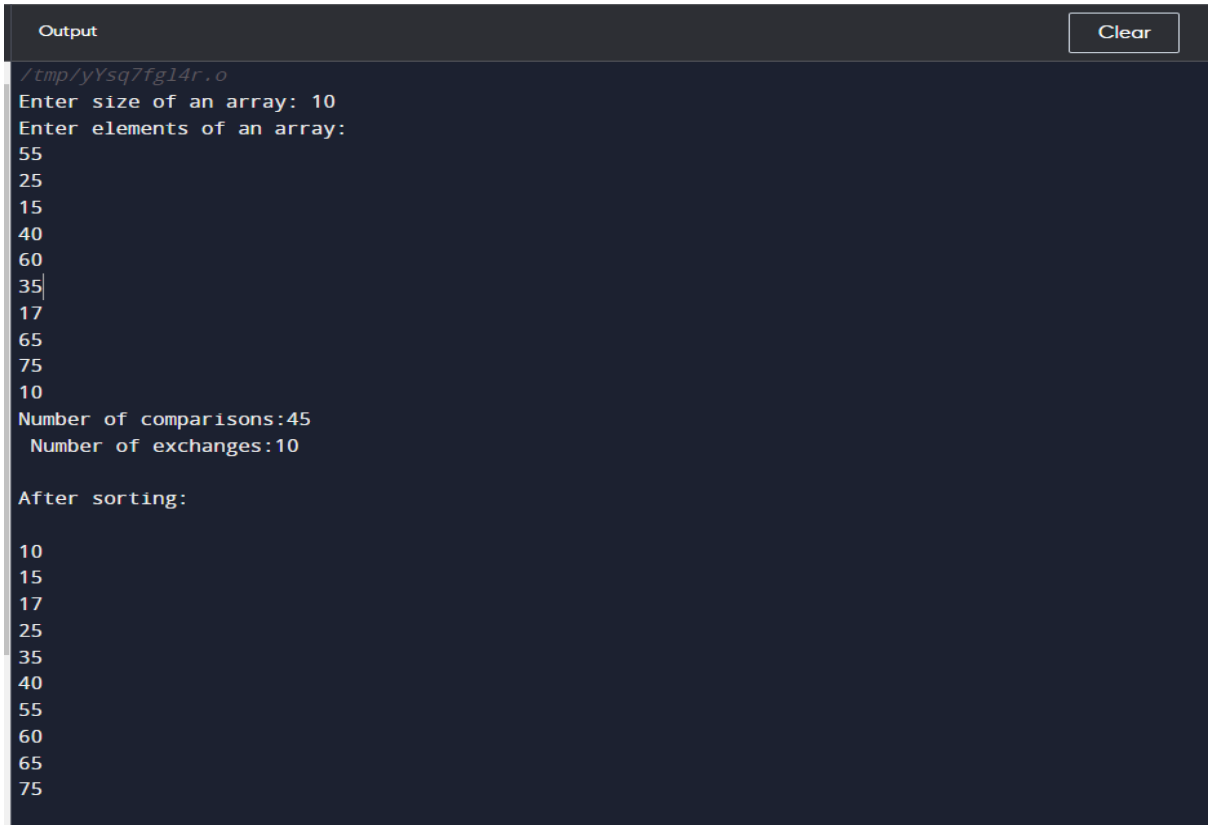
(ii) Number of times comparison operation performed.

Source Code

```
#include <stdio.h>
void selection_sort();
int a[30], n;
void main()
{
   int i;
   printf("\nEnter size of an array: ");
   scanf("%d", &n);
   printf("\nEnter elements of an array:\n");
   for(i=0; i<n; i++)
      scanf("%d", &a[i]);
   selection_sort();
   printf("\n\nAfter sorting:\n");
   for(i=0; i<n; i++)
      printf("\n%d", a[i]);
}
void selection_sort()
{
   int i, j, min, temp;
   int comp=0,swap=0;
   for (i=0; i<n; i++)
```

```
    {
        min = i;
        for (j=i+1; j<n; j++)
        {
            comp=comp+1;
            if (a[j] < a[min])
                min = j;
        }
        temp = a[i];
        a[i] = a[min];
        a[min] = temp;
        swap=swap+1;
    }
    printf("Number of comparisons:%d \n Number of exchanges:%d",comp,swap);
}
```

OUTPUT 4



Ques 5

Examine implemented the performance of Quick soot algorithm on the set of elements.

12 20 22 16 25 18 8 10 6 15

for the following list in terms of Comparisons, exchange operations and the loop will iterate.

Source code

```
#include <stdio.h>
int scount = 0;
int count = 0;
// function to swap elements
void swap(int *a, int *b) {
   int t = *a;
   *a = *b;
   *b = t;
   scount++;
}

// function to find the partition position
int partition(int array[], int low, int high) {
   // select the rightmost element as pivot
   int pivot = array[high];
   // pointer for the greater element
   int i = low - 1;
   // traverse each element of the array
   // compare them with the pivot
   for (int j = low; j < high; j++) {
      count++;
      if (array[j] <= pivot) {
         // if an element smaller than the pivot is found
```

```
            // swap it with the greater element pointed by i
            i++;
            // swap element at i with element at j
            swap(&array[i], &array[j]);
        }
    }

    // swap the pivot element with the greater element at i
    swap(&array[i + 1], &array[high]);
    // return the partition point
    return (i + 1);
}
void quickSort(int array[], int low, int high) {
    count++;
    if (low < high) {
        // find the pivot element such that
        // elements smaller than the pivot are on the left of the pivot
        // elements greater than the pivot are on the right of the pivot
        int pi = partition(array, low, high);

        // recursive call on the left of pivot
        quickSort(array, low, pi - 1);
        // recursive call on the right of pivot
        quickSort(array, pi + 1, high);
    }
}



// function to print array elements
void printArray(int array[], int size) {
```

```
    for (int i = 0; i < size; ++i) {
        printf("%d  ", array[i]);
    }
printf("\n");
}
// main function
int main() {
    int data[50];
    int n;
    printf("Enter the number of elements\n");
    scanf("%d", &n);
    printf("Enter the elements of the array\n");
    for (int i = 0; i < n; i++) {
        scanf("%d", &data[i]);
    }
    printf("Unsorted Array\n");
    printArray(data, n);

    // perform quicksort on data
    quickSort(data, 0, n - 1);
    printf("Sorted array in ascending order: \n");
    printArray(data, n);
    printf("count of comparison:%d\n", count);
    printf("count of swapping:%d\n", scount);

return 0;
}
```

OUTPUT 5


Output
Clear
/tmp/yYsq7fgl4r.o
Enter the number of elements
10
Enter the elements of the array
12
20
22
16
25
18
8
10
6
15
Unsorted Array
12 20 22 16 25 18 8 10 6 15
Sorted array in ascending order:
6 8 10 12 15 16 18 20 22 25
count of comparison:42
count of swapping:19

MCSL216 (PART II)

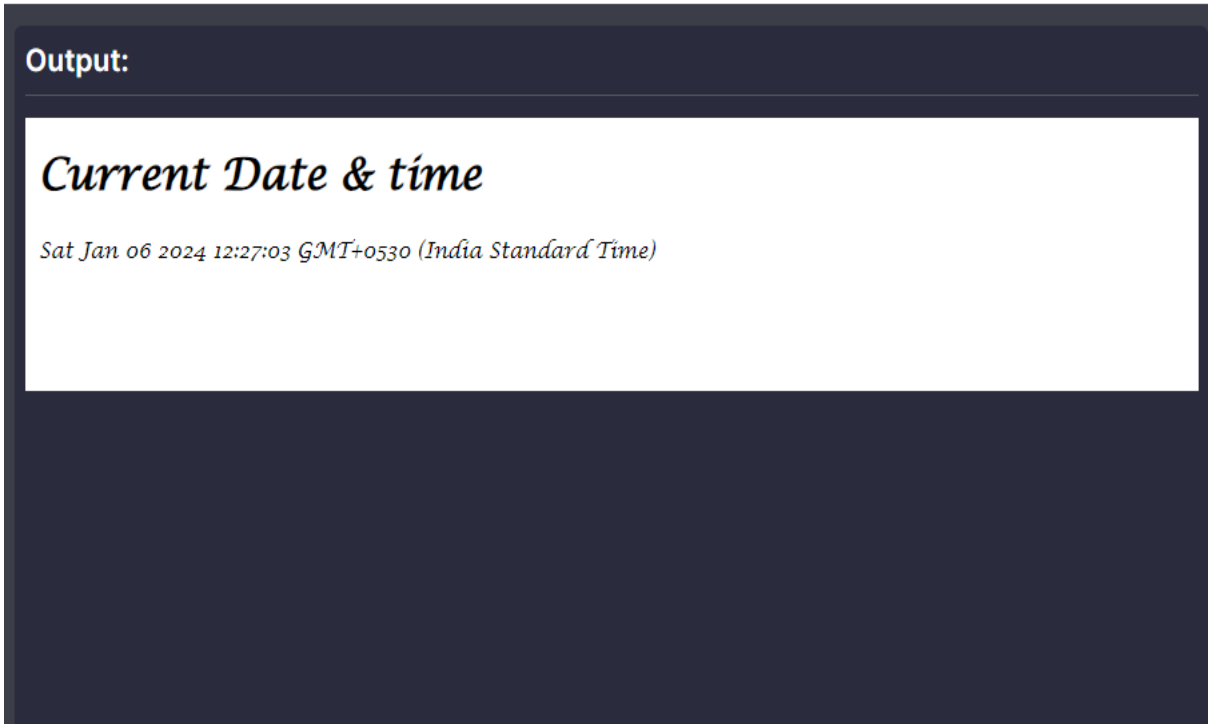
Ques 1:

Write a Javascript program to print current date and time

Source Code

```
<!DOCTYPE html>
<html>
<head></head>
<body>
<h1>Current Date & time</h1>
<p id="p1"></p>
<script>
        var date = new Date();
        document.getElementById("p1").innerHTML = date;
</script>
</body>
</html>
```

OUTPUT



Ques 2:

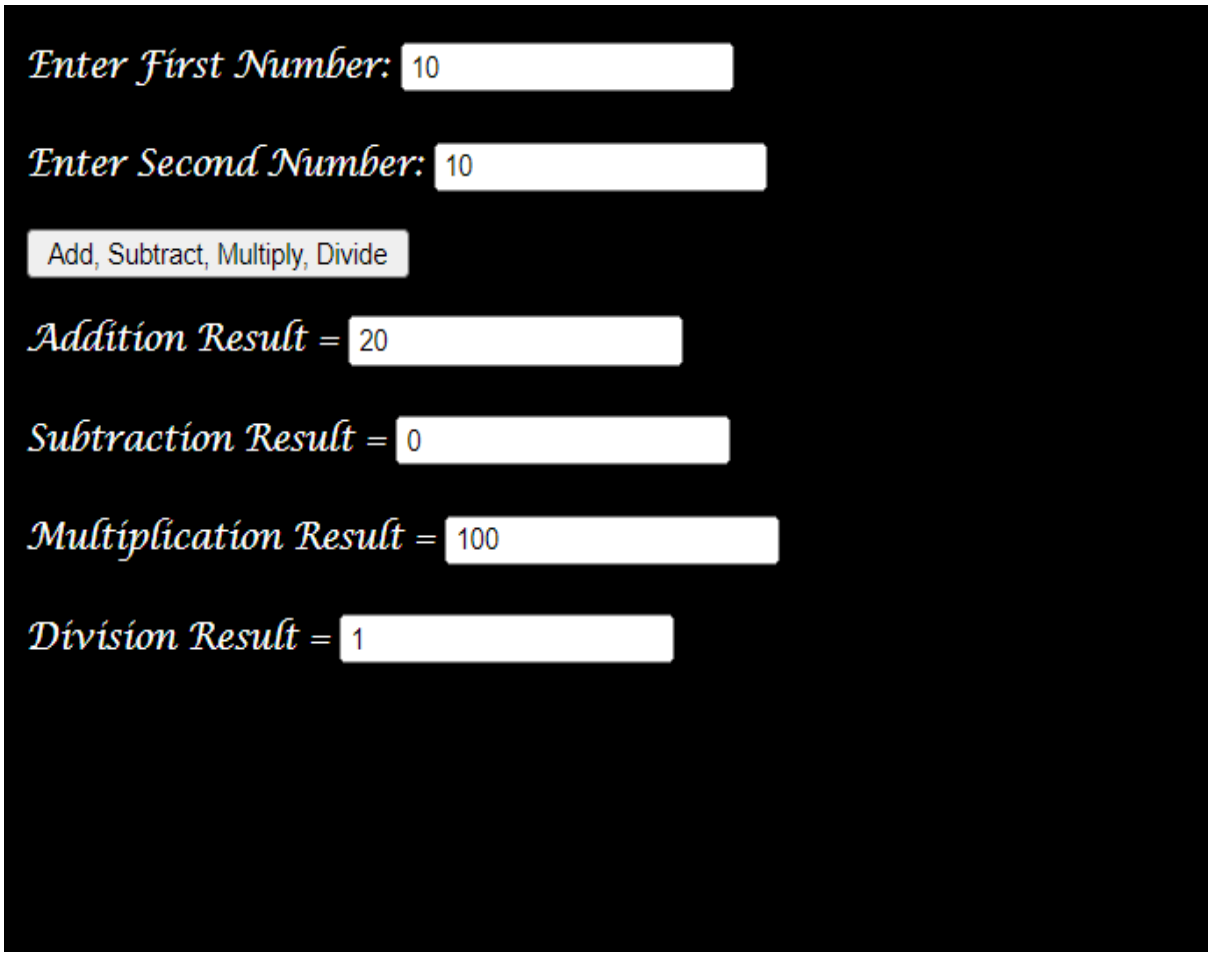
write a program to calculate addition subtraction multiplication and division

Source Code

```
<!doctype html>
 <html>
    <head>
       <script>
          var numOne, numTwo, res, temp;
          function fun()
          {
           numOne = parseInt(document.getElementById("one").value);
           numTwo = parseInt(document.getElementById("two").value);
           if(numOne && numTwo)
            {
             temp = document.getElementById("res");
             temp.style.display = "block"; res = numOne + numTwo;
             document.getElementById("add").value = res; res = numOne - numTwo;
             document.getElementById("subtract").value = res; res = numOne * numTwo;
             document.getElementById("multiply").value = res; res = numOne / numTwo;
             document.getElementById("divide").value = res;
            }
          }
 </script>
 </head>
 <body>
   <p id="input">Enter First Number: <input id="one"> <br/><br/>
        Enter Second Number: <input id="two">
        </p>
    <p>
<button onclick="fun()">Add, Subtract, Multiply, Divide</button>
```

```
</p>
    <p id="res" style="display:none;">
Addition Result = <input id="add"><br/><br/>
Subtraction Result = <input id="subtract"><br/><br/>
Multiplication Result = <input id="multiply"><br/><br/>
Division Result = <input id="divide">
</p>
</body>
</html>
```

OUTPUT



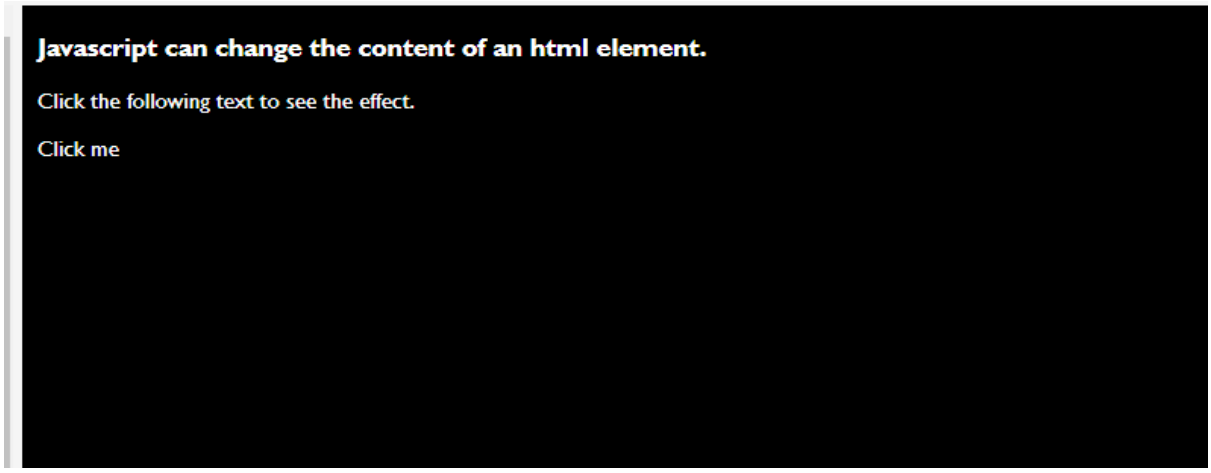
Question:3

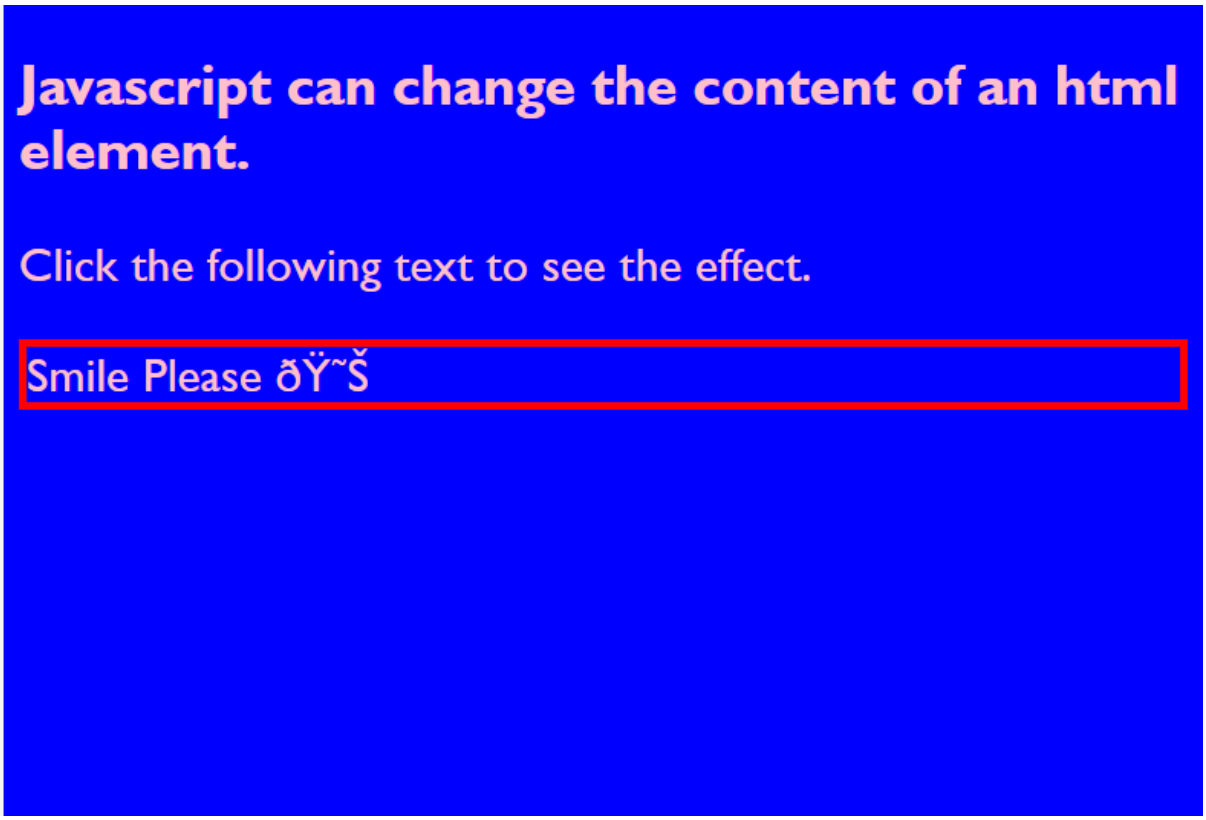
Write a javascript code to change the contents of an element like header tag or paragraph tag or division tag etc when user clicks on it.

Source Code

```
<!DOCTYPE html>
<html>
<head>
</head>
<body>
<h3> Javascript can change the content of an html element. </h3>
<p> Click the following text to see the effect. </p>
<p id = "para">Click me</p>
<script>
document.getElementById("para").onclick = function()
{
fun()
};
function fun()
 {
   document.getElementById("para").innerHTML = "Smile Please 😊";
   document.getElementsByTagName("body")[0].style.color = "pink";
   document.getElementsByTagName("body")[0].style.backgroundColor = "blue";
   document.getElementsByTagName("body")[0].style.fontSize = "25px";
   document.getElementById("para").style.border = "4px solid red";
}
</script>
</body>
</html>
```

OUTPUT


Javascript can change the content of an html element.
Click the following text to see the effect.
Click me


Javascript can change the content of an html element.
Click the following text to see the effect.
Smile Please ðŸ˜Š

Question:4

Create a registration form with a attributes name, Password, email id, phone number and validate and Username field as only having the Phone number Username the name characters, validate e-mail-id and with a length of 10.

Source Code

```
<html>
<head>
   <script>
      function  VALIDATION()
                {
         var name = document.forms.RegForm.Name.value;
         var email = document.forms.RegForm.EMail.value;
         var phone = document.forms.RegForm.Telephone.value;
         var password = document.forms.RegForm.Password.value;
         var uname =document.forms.RegForm.Uname.value;

         //Javascript for Email Validation.
                  var regEmail=  /^\w+([\.-]?\w+)*@\w+([\.-]?\w+)*(\.\w{2,3})+$/g;
         // Javascript for Phone Number validation
                   var regPhone=/^\d{10}$/;   .
                   var regName = /\d+$/g;
         // Javascript for Name validation
                  var regUName = /\d+$/g;

         if (name == "" || regName.test(name))
                           {
            window.alert("Please enter your name properly.");
            name.focus();
            return false;
         }
```

```
if (uname == "" || regUName.test(uname))
                {
    window.alert("Please enter your  username properly.");
    uname.focus();
    return false;
  }
  if (email == "" || !regEmail.test(email))
                {
    window.alert("Please enter a valid e-mail address.");
    email.focus();
    return false;
  }
  if (password == "")
                {
    alert("Please enter your password");
    password.focus();
    return false;
  }
  if(password.length <6)
                {
    alert("Password should be atleast 6 character long");
    password.focus();
    return false;
  }

  if (phone == "" || !regPhone.test(phone))
                {
    alert("Please enter valid phone number.");
    phone.focus();
    return false;
  }
```

```
            return true;
        }
    </script>

    <style>
        div {
            box-sizing: border-box;
            width: 100%;
            border: 100px solid black;
            float: left;
            align-content: center;
            align-items: center;
        }

        form {
            margin: 0 auto;
            width: 600px;
        }
    </style>
</head>
<body>
    <h1 style="text-align: center;">REGISTRATION FORM</h1>
    <form name="RegForm" onsubmit="return VALIDATION()" method="post">

        <p>Name: <input type="text" size="65" name="Name" /></p>
        <br />
        <p>Username: <input type="text" size="65" name="Uname" />
        </p>
        <br />
        <p>E-mail Address: <input type="text" size="65" name="EMail" /></p>
        <br />
```

```
        <p>Password: <input type="text" size="65" name="Password" /></p>
        <br />
        <p>Telephone: <input type="text" size="65" name="Telephone" /></p>
        <br />
        <br />
        <br />
        <p>
            <input type="submit" value="Register" name="Submit" />
            <input type="reset" value="Reset" name="Reset" />
        </p>

    </form>
</body>
</html>
```

OUTPUT