

INDIAN INSTITUTE OF TECHNOLOGY ROPAR Department of Computer Science & Engineering GE103Introduction to Computing & Data Structures

MidTerm Exam 050ct 2018

Max. Marks: 40

Time Limit: 120 minutes

Roll No:



NOTE:

Name:

- Read the questions carefully, and write your answers as neatly as possible.
- Read the questions carefully.
 You need to write your answers in the space provided below each question. No extra sheet should be attached to this paper. Rough work may be done in the space provided or in last empty sheet.
- Best wishes!
- 1. [2 marks] Consider a two dimensional array: A[6][8] of total 48 integer elements. If the base address (A) is 1600 and the system uses zero-indexing, what is the memory address of element A[3][4]? Assume:
 - (a) Row-major order

1616 , 1612

1100 + 4×3

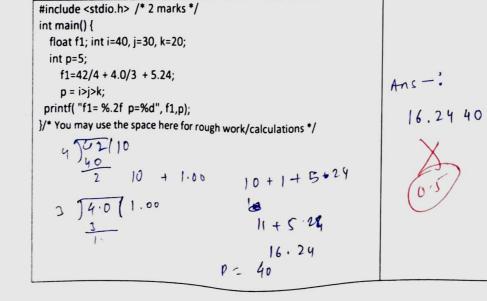
(b) Column-major order

1612, 1616

1600 + 4 × 4

2. [18 marks] What will be the output for the following codes. Explanation for the output not necessary.

Answers / OUTPUT



Answers / OUTPUT #include<stdio.h> /* 2.5 marks */ void main() { char arr[] = {'I', 'a', 't', 'e', 's', 't'}; //First element is L lower case char p = (arr+2); printf("%c", *p+2); 5 6 1 printf("\n %d %d", sizeof(arr), sizeof(p)); }/* You may use the space here for rough work/calculations */ Me + 2 = alu [2] #include <stdio.h> /* 2.5 marks */ Ans-: void main() for (int k=1; k< 4;) printf("%d \n", ++k); }/* You may use the space here for rough work/calculations */ 2,3,4 # include <stdio.h> /* 3 marks */ int main() { int i = 0; for (i=1; i<20; i++) { switch(i) { case 1: i += 1; case 2: i += 3; 21 13 case 4: i += 4; default: i += 8: break; printf(" %d ", i); return 0; }/* You may use the space here for rough work/calculations */ (1) → 1: 2,3, (=2,5,13,21, 2, b, t, g,

```
Answers / OUTPUT
#include <stdio.h> /* 2 marks */
#define ALPHA 0
#define BETA 1
int main() {
  int i = 5;
                                                                     Ans
  switch (i & 1)
                                                                           beta
     default: printf("Default");
     case ALPHA: printf("alpha");
                                    break;
     case BETA: printf("beta");
                                    break;
   }
 return 0:
 }/* You may use the space here for rough work/calculations */
         0101
           0001 = 1 -> beta.
 #include <stdio.h> /* 3 marks */
 int main(){
         int k, sum=0;
         for (k=2048; k; k>>= 1)
             sum++;
         printf("%d %o %x ", sum, sum+1, sum+2);
         return 0;
  } /* You may use the space here for rough work/calculations */
                                                                  4
10.5) 100 all my
  #include <stdio.h> /* 3 marks */
  void main()
  { int i=1, j=5, k=11;
   int *p = &j; int *q = p; int *r = &k;
   *p = i; (*p)++;
   i += 2;
   *r = *r - *q;
    p=r; j=j+i;
   k = k + *q;
   printf( "%d %d %d ", i, j, k );
  }/* You may use the space here for rough work/calculations */
    4= 1°
```

3. [2 marks] A student wrote following code for reversing an input integer array A of n elements. But on execution, it is observed that the code is wrong. Student approached the TA Raman who replied that there is/are small mistake(s) in this code. Spot the mistake(s)

(Encircle that line(s)) & mention with a small mistake(s) in this code. (Encircle that line(s)) & mention what should be the correct statement/expression(s) there.

```
void reverse(int A[], int n) {
    int i, j, temp;
i=0; seart (" 1.d", &n); X
    while (i < n) {
        j= n-1-i;
        temp = A[i];
       Refer to following partial the said
        A[i] = A[j];
```

[3 marks] Refer to following partial C code to transpose a square matrix (or say 2D array). Complete the code (.... part) without using any additional array and without declaring any additional variable.

```
#include <stdio.h>
#define N 12 /* this value 12 may vary by program user*/
void main() {
  int A[N][N]; int i,j,k,temp1,temp2;
  printf("\n Input the NxN matrix elements where N=%d. \n", N);
  for (i=0;i<N;i++) {
        for (j=0;j<N;j++)
           scanf("%d ",&(A[i][j]) );
 "for ( K = 1; K < N; K++)

{ temp 1 = A [i+k]
             A[i+k] = A[j+k]
             A[j+K] = temp 1
        temp 2 = A[in][jt]
A[i][j]
             Kirt of (" New mateix", temp).
  printf("\n Following is the TRANSPOSE matrix \n");
  for (i=0;i<N;i++) { printf("\n");
        for (j=0;j<N;j++)
```

```
printf("%d ", (A[i][j]) );
}
```

}

5. [3 marks] Consider the following C code that aims to print the multiplication table of input value n (assume input n will be positive and less than 100).
Will this program give the desired output ? If not, Identify and Remove the errors (Mark / Encircle the wrong statements (if any) and write there correct statements.)

```
#include <stdio.h>
        void main() {
          int n,factor,k;
          printf("\n Enter the number for which you need to print multiplication table \n");
          scanf("%d ", n);
           printf("\n Multiplication table is as follows \n");
           factor=1;
           while (factor<=10) {
             k=n * factor;
             printf("%d X %02d = %d", n, factor, k); tactor + + ;
Revoulte code -:
   # include < stdio. h>
        void main ()
       Printf (" In sutificate table a's follows | h"),

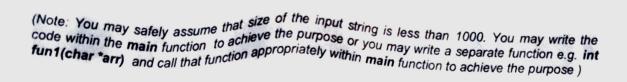
Mintf (" In Multiplicate table a's follows | h"),
               factor =1;
            while (factor (=10)
                  K = n + factor,
                  printf (" y.d * 1.02d = %d", n, factor, K);
                   factor++,
```

- [5 marks] Given an input string inp, complete the C program below that does the following
 It first computes the total number of the computer twice or more in the It first computes the total number of those characters that appear twice or more in the input string.
 - Then it removes all digits (if any in the input string) and also changes the input string alphabets to lowercase. Then it print

As an example, if input string inp is "Animesh181SharmAaa", the output would be No. of characters that repeat

No. of characters that repeat = 5 Output String: animeshsharmaaa

```
/*Ans above 5 because A, m, h, 1, and a are the characters that appear again */
#include<stdio.h>
/* you are not permitted to use any other library functions */
#define SZ 1000
void main() {
   int i,j,k,temp1,temp2; char c1, c2, c3;
   char inp[SZ]; scanf("%s", inp);
                                                                                                                                                                                                                                               Animorh 181 Show made
        for ( i= 0, @inp[i] != 10, i++)
                      templ = (slelen (inp[i]).
                                             ir ( inpli] ==inplit)
                        \frac{1}{c} \frac{1}{c} \frac{1}{c} \frac{1}{c} = \frac{1}{c} \frac{
                                                                         ( | ( cy = = '4') | ( c1 = = '5') | ( c1 = = '61)
                                                                                              11 (c,=='q') 11 (c,=='g'))
                                      temp 2 = temp 1 - C,;
                                           printf (" y s", tempz);
               to convert in lower case
                                                              temp 2 = inp[i] . To dower case;
                                                                printf (" output dring ", temps).
```



6. [7 marks] Consider a singly linked list (based on NODE structure as mentioned below) referred using the global node pointer variable head. Write the C code for successfully deleting the (first appearing) node having data value key. If there is no node in the linked list that has data value key, the code brings no change to the linked list. If there are multiple nodes with data value key, the code deletes that one which appears first while traversing the linked list using global pointer variable head.

typedef struct node(int data; struct node * next;

) NODE:

Function prototype is as follows - void find_delete(int key);

int main ()

\$ 5

struct node* Key;

head => data = 1;

head -> next = NULL;

Key -> next = NULL;