**Questions and Answers on C – Programming for BSc Major 6th Semester paper-6.4**

1. **State whether the following are True or False: 1x10=10**
2. **a=b and a==b are same. (b) A statement cannot be nested. (c) Identifier should not starts with number or special character (d) Assignment operators are associative from right to left.**

**(e) Keywords cannot be used as Identifiers. (f) A breaking point is a temporary stopping within a program before execution. (g) Relational operators have lower precedence than arithmetic and unary operators (h) A pointer is a variable that represents the location of a data items. (i) An Array name is a pointer to the first element in the array. (j) Recursion is a process by which a function calls itself repeatedly until some specific condition has been satisfied.**

**Solution: (a) F (b) F (c) T (d)T (e) T (f) T(g) T (h) T (i) T (j) T (T=TRUE ,F=FALSE).**

1. **How are the following Mathematical functions expressed in FROTRAN-95/C/C++: 2x5=10**
2. **Absolute value of x2 + 5y2cosx(ii) + logx3 (iii) +**

**(iv) x (v) y=.**

**Solution: (i) abs(x\*x+5\*y\*y\*cos(x)) (ii) sqrt(x\*x\*asin(y)+3\*y\*y\*y)+log(x\*x\*x) (iii)log10(x)+atan(y)+acos(x) (iv)x != (v) y=(exp(x\*x\*x)+tan(x\*x))/(pow(x,9)+pow(z,11)\*sin(x))**

1. **(a)Write a program in FROTRAN-95/C/C++ to find the greatest of five numbers. 5**

**(b) Write a program in FROTRAN-95/C/C++ to generate AP series with common difference 3 and number of elements 20 and also find its sum. 5**

**(c) Write a program in FROTRAN-95/C/C++ to compute roots of the following quadratic equation:**

 **, with a=4 , b=6 and c=2. 5**

**(d) Write a program in FROTRAN-95/C/C++ to determine mean and standard deviation of given experimental data. 5**

**(e) Write a program in FROTRAN-95/C/C++ to find sum of N odd numbers. 5**

**Solution :(a) /\* Find greatest of five numbers\*/**

**#include <stdio.h>**

**#include <stdlib.h>**

**#include<conio.h>**

**int main()**

**{ int num,i;**

 **float \*data;**

 **printf("Enter the total number of elements: ");**

 **scanf("%d", &num);**

**/\*Allocating memory for numbers elements\*/**

 **data = (float \*)calloc(num, sizeof(float));**

 **if (data == NULL)**

**{ printf("Error!!! memory not allocated.");**

 **exit(0);**

 **}**

 **/\*Storing numbers entered by the user\*/**

 **for (i = 0; i < num; ++i) {**

 **printf("Enter Number %d: ", i + 1);**

 **scanf("%f", data + i);**

 **}**

 **/\*Finding the largest number\*/**

 **for (i = 1; i < num; ++i) {**

 **if (\*data < \*(data + i))**

 **\*data = \*(data + i);**

 **}**

 **printf("Greatest number = %.2f", \*data);**

 **return 0;**

**}**

**(b) /\* Write a C program to generate AP series and find its sum.\*/**

**/\*AP series is a series of numbers in which the difference between the\*/**

 **/\*consecutive elements is same.\*/**

**/\*Example: 1, 3, 5, 7, 9, 11, 13, 15, 17, 19\*/**

**/\*Here, the common difference is 2.\*/**

**/\*And the sum of the AP series can be found by using the below formula.\*/**

**/\*Sum = n \* (a1 + an)/2 => (10 \* (1 + 19)) / 10 = 100\*/**

**/\*n is the number of elements in the AP series.\*/**

**/\*a1 is the first element in the AP series.\*/**

**/\*an is the last element in the AP series.\*/**

**#include <stdio.h>**

 **#include <stdlib.h>**

**#include <conio.h>**

**void main()**

**{**

 **int i, n, \*data, diff, sum, value = 1;**

 **/\* get the number of elements in AP series \*/**

 **printf("Enter the value for number of elements:");**

 **scanf("%d", &n);**

 **/\* get the common difference from the user \*/**

 **printf("Common difference for AP series:");**

 **scanf("%d", &diff);**

 **/\* allocate memory to store the elements in AP series \*/**

 **data = (int \*)malloc(sizeof(int) \* n);**

 **/\* print the series and store the AP series in data array \*/**

 **printf("AP series: ");**

 **for (i = 0; i < n; i++) {**

 **printf("%d ", value);**

 **data[i] = value;**

 **value = value + diff;**

 **}**

 **/\* find the sum of the given AP series \*/**

 **sum = (n \* (data[0] + data[n - 1]))/2;**

 **/\* print the result \*/**

 **printf("\nSum of the AP series is %d\n", sum);**

**getch ();**

**}**

 **/\* Output Enter the value for number of elements:20\*/**

 **/\*Common difference for AP series:3\*/**

 **/\*AP series: 1 4 7 10 13 16 19 22,25,28,31,34,37,40,43,46,49,52,55,58\*/**

 **/\* Sum of the AP series is 590\*/**

**(c) /\* Roots of quadratic equation\*/**

**#include<stdio.h>**

**#include<conio.h>**

**#include<math.h>**

**int main()**

**{ int a=4,b=6,c=2; /\*if values of a, b and c are given else you have write printf and scanf statement\*/**

**float D,root1,root2;**

**/\*printf("\n Enter values of coefficients of x a,b,c\n");\*/**

**/\*scanf("%d%d%d",&a,&b,&c);\*/**

**D=b\*b-4\*a\*c;**

**if (D<0)**

**{**

**root1=-b/(2\*a);root2=sqrt((-D))/(2\*a);**

**printf("Roots are imaginary and are %f+%fi and %f-%fi\n",root1,root2,root1,root2); }**

**if (D>0)**

**{root1=-b/(2\*a)+sqrt(D)/(2\*a);root2=-b/(2\*a)-sqrt(D)/(2\*a);**

**printf("\n Real roots are %f and %f\n", root1,root2);}**

**if (D==0)**

**{root1=-b/(2\*a);root2=root1;**

**printf("\n Real roots are equal %f and %f\n", root1,root2); }**

**return 0;**

**}**

**(d) /\* Mean and Standard Deviation from given Experimental data\*/**

**/\*Write a C program to find mean, median, variance and standard deviation for given set of numbers\*/**

**#include <stdio.h>**

**#include <conio.h>**

**#include <stdlib.h>**

**#include <math.h>**

 **void main()**

**/\* If You write int main() then use return0\*/**

**{ float \*x,mean=0,median,sd,variance=0;**

 **int n,i,j,temp;**

 **printf("Enter the no of entries:");**

 **scanf("%d",&n);**

 **x=(float\*)malloc(sizeof(float)\*n);**

 **/\* get n inputs from user \*/**

 **printf("Enter your inputs:\n");**

 **for(i=0;i<n;i++)**

 **scanf("%f",&x[i]);**

 **/\* calculate the mean \*/**

 **for(i=0;i<n;i++)**

 **mean=mean+x[i];**

 **mean=mean/n;**

 **/\* calculate the variance\*/**

 **for(i=0;i<n;i++)**

 **variance=variance+pow((x[i]-mean),2);**

 **variance=variance/n;**

 **/\* square root of variance is SD \*/**

 **sd=sqrt(variance);**

 **/\* sort the given inputs to find median \*/**

 **for(i=0;i<n-1;i++)**

 **for(j=i;j<n;j++)**

 **{ if(x[i]>x[j])**

 **{ temp=x[i];**

 **x[i]=x[j];**

 **x[j]=temp;**

 **}**

 **}**

 **/\* calculate the median \*/**

 **if ((n + 1)%2==0) {**

 **median=x[((n+1)/2)-1];**

 **} else**

 **{**

 **median=(x[((n+1)/2)-1]+x[((n+2)/2)-1])/2;**

 **}**

 **/\* print the outputs \*/**

 **printf("Standard deviation: %f\n",sd);**

 **printf("Variance: %f\n",variance);**

 **printf("Mean : %f\n",mean);**

 **printf("Median: %f\n",median);**

 **getch ();**

**}**

 **/\* Output when you inputs Enter the no of entries:5\*/**

**/\* Enter your inputs: 600 470 170 430 300\*/**

**/\* Standard deviation: 147.321609\*/**

 **/\*Variance: 21703.656250\*/**

 **/\*Mean : 394.000000\*/**

**/\* Median: 430.000000\*/**

**(e) /\*Write a C program to find the sum of first n odd numbers\*/**

**#include <stdio.h>**

**#include <conio.h>**

**void main()**

**/\* If You write int main() then use return0\*/ {**

 **int num,count=0,j=1,sum=0;**

 **/\* get the input n from the user \*/**

 **printf("Enter the value for n:");**

 **scanf("%d",&num);**

 **/\* calculate the sum of first n odd numbers \*/**

 **while (count<num)**

 **{ if(j%2!=0)**

 **{ sum=sum+j;**

 **count++;**

 **}**

 **j++;**

 **}**

 **/\*print the sum of first n odd numbers \*/**

 **printf("Sum of first %d odd numbers is %d\n",num,sum);**

 **getch ();**

 **}**

**/\* Output when you give input Enter the value for n:100\*/**

 **/\*Sum of first 100 odd numbers is 10000\*/**

1. **Write a program in FROTRAN-95/C/C++ to solve the differential equation in the interval [1,1.5] having initial value y=0.8 at x=1 and step size h=0.5 using Runge-Kutta 4th order method. What is the order of error in such method. 8+2**

**/\* Solution of differential equation dy/dx= x\*x+y\*y \*/**

**#include<stdio.h>**

**#include <math.h>**

**#include<conio.h>**

**#define F(x,y) x\*x + (y)\*(y)**

**void main()**

**{**

 **double y0,x0,y1,n,h,f,k1,k2,k3,k4;**

 **clrscr();**

 **printf("\nEnter the value of x0 =0: ");**

 **scanf("%lf",&x0);**

 **printf("\nEnter the value of y0=0: ");**

 **scanf("%lf",&y0);**

 **printf("\nEnter the value of h: ");**

 **scanf("%lf",&h);**

 **printf("\nEnter the value of last point=2/3/4: ");**

 **scanf("%lf",&n);**

 **for(; x0<n; x0=x0+h)**

 **{**

 **f=F(x0,y0);**

 **k1 = h \* f;**

 **f = F(x0+h/2,y0+k1/2);**

 **k2 = h \* f;**

 **f = F(x0+h/2,y0+k2/2);**

 **k3 = h \* f;**

 **f = F(x0+h/2,y0+k2/2);**

 **k4 = h \* f;**

 **y1 = y0 + ( k1 + 2\*k2 + 2\*k3 + k4)/6;**

 **printf("\n\n k1 = %.4lf ",k1);**

 **printf("\n\n k2 = %.4lf ",k2);**

 **printf("\n\n k3 = %.4lf ",k3);**

 **printf("\n\n k4 = %.4lf ",k4);**

 **printf("Solution of 1st Order ODE RK Method y(%.4lf) = %.3lf\n ",x0+h,y1);**

 **y0=y1;**

 **}**

 **getch();**

**}**

 **/\* When you enter x0=1.0, y0=0.8, h=0.5 and last point xn=1.5 \*/**

**/\* output coefficients k1=0.82, k2=1.4821, k3=1.9374, k4=1.9374 \*/**

**/\* Numerical solution y(1.5)=2.39 \*/**

 **5. Write a program in FROTRAN-95/C/C++ to compute the numerical value of the standard integral for n=50**

 **using Simpson’s one-third (1/3) rule.**

 **//\* Program to Evaluate Numerical Integration 1/(1+x^2) and to calculate value of Pi using Simpson\*/**

**#include<stdio.h>**

**#include<conio.h>**

**#include<math.h>**

**float y(float x)**

 **{**

 **return 1/(1+x\*x);**

 **}**

 **int main ()**

 **{ int i,n;**

 **float h,x0,xn,s, I,PI;**

 **printf("Enter intial value x0,final value xn ,number of intervals n\n");**

 **scanf("%f%f%d",&x0,&xn,&n);**

 **h=(xn-x0)/n;**

 **s=y(x0)+y(xn)+4\*y(x0+h);**

 **for(i=3;i<=n-1;i+=2)**

 **s+=4\*y(x0+i\*h)+2\*y(x0+(i-1)\*h);**

 **I=(h/3)\*s;**

 **PI=4\*I;**

 **printf(" Value of Integration %6.4f, value of Pi x = %9.6f\n",I,PI);**

 **return 0; }**

 **/\* Enter lower limit of integration x0=0 and upper limit xn=1 and number of interval n=50\*/**

**/\* output I=0.785398 and π=4\*I=3.141593\*/**

**Question 5. Write the difference between keywords and identifiers.**

**Keywords:- They are reserved words , that have standard predefined meaning in C. These Keywords can be used only for their intended purpose; they cannot be used as programmers defined identifiers. Keywords are always in small letters it is possible to use upper case keyword as identifiers. Normally it is not done as it is considered a poor programming practice.**

**Example of keywords :- auto , break, case, char, const, continue, default, do, double, else, enum, extern, float, for, goto, if, int, long, register, return, short, signed, sizeof, static, struct, switch, typedef, union, unsigned, void, volatile, while.**

**Identifiers:- they are names that are given to various program elements, such as variables, functions and arrays.**

**Identifiers consist of letters and digits, in any order, except that the first character must be a letter. Both upper- and lowercase letters are permitted, though common usage favours the use of lowercase letters for most types of identifiers. Upper- and lowercase letters are not interchangeable ( an uppercase letter is not equivalent to the corresponding lowercase letter). The underscore ( \_ ) can also be included and is considered to be a letter. An underscore is used in the middle of an identifier. An identifier may also begin with an underscore, though this rarely done in practice.**

**Example of identifiers :- area, sum, total\_number, Time\_table, time123, x1, y1, X1,Y1 perimeter, volume, surface\_area, pi, circle, circumference, PI, value, Number\_of\_student.**

**Question 2:- Write the following algebraic expression in C/C++ / or FORTRAN-95:-**

1. **y=sin-1 x + cos-1 x + tan-1 x, (ii) y= (iii) +**

**Solution:- In C expressions can be written as-**

1. **y=asin(x)+acos(x)+atan(x) .**
2. **y=(pow(x,99)\*atan(x)+pow(z,8))/(pow(u,8)+pow(v,77).**
3. **exp(x\*x)+cos(x)+abs(x)**