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(An Institute of National Importance, Ministry of Education, Government of India)

## MAJOR EXAMINATION-2024

**Course Code**: CS/IT-101 **Date**: 25-11-2024 (Mon)

**Course Name**: Principles of Computer Programming **Max Marks**: 45

**Program & Sem**: B.Tech (IMT/IMG/CSE/MSC/EEE), 1st Semester **Time**: 3 Hrs

**Instructions:**

*(i) Read the all questions carefully and answer accordingly.*

*(ii) This Question paper contains questions.*

### Part A

Answer all the Questions.

Each question carries *one* marks. (10 Questions x 1 Mark = 10 Marks)

**Q1. Consider the following C declaration:**

```
union student
{
   int  rollno;
   char  div;
   union name
   {
    char first_name[20];
    char last_name[20];
   }n1;
struct {
   short s[5];
   union {
      float y;
      long z;
   }u;
} t;
}s1;
```

**Assume that data type char, short, int, float and long occupy 1 bytes, 2 bytes, 2 bytes, 4 bytes and 8 bytes, respectively. The memory requirement for variable t and s1, ignoring alignment considerations, is:**

(a) 22 and 14 bytes (b) 14 and 18 bytes
(c) 18 and 20 bytes (d) 10 and 16 bytes

**Q2. Let x be an integer which can take a value of 0 or 1. The statement:**

```
if (x == 0) x = 1; else x = 0;
```

**is equivalent to which one of the following ?**

(a) x=1+x; (b) x=1-x; (c) x=x-1; (d) x=1%x;

Q3. Of the following which is NOT a logical error:

(a) Using = instead of = = to determine if two values are equal
(b) Divide by zero
(c) Failing to initialize counter and total variables before looping body
(d) Using commas instead of semicolon in a for loop statement

Q4. Which of the following is not a valid C variable name?

(a) int main$; (b) int main; (c) Both (a) and (b) (d) None

Q5. What is the purpose of a return statement in a C function?

(a) To exit the program
(b) To send a value back to the function caller
(c) To print a value
(d) To terminate a loop

Q6. Which of the following is the correct way of accessing the members of a structure variable:

(a) Using dot notation, v.x
(b) Using indirection notation, (*ptr).x
(c) Using selection notation, ptr -> x
(d) All of the above

Q7. Which of the following functions is used to search a substring in another string

(a) strstr() (b) searchstr() (c) substr() (d) strchr()

Q8. Which of the following is an INCORRECT representation?

(a) scanf("%[^\n]",str); (b) scanf("%s", &str); (c) gets(str) (d) All are correct

Q9. What are the different ways to initialize an array with all elements as zero?

(a) int array[5] = {};
(b) int array[5] = {0};
(c) int a = 0, b = 0, c = 0; int array[5] = {a, b, c};
(d) All of the mentioned

Q10. What is the output of C program

```
int main()
{ int a = 20;   //a memory location = 1234
printf("%d %d %d %d", a, &a, *(&a));
return 0;}
```

(a) 20 20 20
(b) 20 1234 1234
(c) 20 1234 20
(d) 20 Unknown Memory Address Unknown Memory Address

## Part B

Answer all the Questions.

Each question carries 2 marks. (10 Questions x 2 marks = 20 Marks)

Q11. What will be the output of the following program? For no output/error, explain the reason.

a.
```
#include<stdio.h>
int main()
{
 void pr();
 pr();    pr();    pr();
return 0;  }
void pr()
{
```

b.
```
#include<stdio.h>
int main()
{
 int a=5;
 int b=10,c=0,d=2;
 int e=a>>d||b<<c;
 int f=a--&&--b||++c;
 printf("e=%d, f=%d", e,f);
```

```
static int i=1;
printf("%c\n",(65+i++));
printf("%d\n",i);
}
```

```
return 0;
}
```

c.
```
#include<stdio.h>
int counter=0;
int calc (int a, int b)
{ int c;
counter++;
if(b==3)
return (a*a*a);
else
{c = calc(a, b/3);
return (c*c*c);
}
}
int main() {
calc(4, 81);
printf("%d", counter);}
```

d.
```
#include <stdio.h>
int main ()  {
int sum = 0, maxsum = 0,  i,  n = 6;
int a [] = {2, -2, -1, 3, 4, 2};
for (i = 0; i < n; i++)
{if (i == 0 || a [i]  < 0  || a [i] < a [i - 1])
{ if (sum > maxsum)
  maxsum = sum;
  sum = (a [i] > 0) ? a [i] : 0;
}
else
sum += a [i]; }
if (sum > maxsum) maxsum = sum ;
printf ("%d\n", maxsum);
}
```

e.
```
#include <stdio.h>
int g(int p)
{ printf("%d\t", p); return p;}
int h(int q)
{ printf("%d\t", q); return q;}
void f (int x, int y) {
g(x);
h(y);
}
int main()
{
f (g(10), h(20));
}
```

f.
```
#include <stdio.h>
void p1(void)
{ static int x = 10;
x += 5;
printf("%d\n",x); }
void p2(void)
{ static int x;
  x = 10;
  x += 5;
  printf("%d\n",x); }
int main()
{  p1();   p1();
   p2();   p2(); return 0;}
```

g.
```
#include <stdio.h>
void solve()
{
char ch[10] = "abcdefghij";
int ans = 0;
for(int i = 0; i < 10; i++)
{
ans += (ch[i] - 'a');
}
printf("%d", ans);
}
int main() {
solve();
return 0;
}
```

h.
```
#include <stdio.h>
void mystery(int *ptra, int *ptrb) {
int *temp;
temp = ptrb;
ptrb = ptra;
ptra = temp;
}
int main() {
int a=2016, b=0, c=4, d=42;
mystery(&a, &b);
if (a < c)
mystery(&c, &a);
mystery(&a, &d);
printf("%d\n", a);
}
```

i.
```
#include <stdio.h>
int main()
{
char str1[]= "PCP Major 25/11/2024";
```

j. Output of sum and Number of times sum will be printed:
```
#include <stdio.h>
int main(){
float sum = 0.0, j = 1.0, i = 2.0;
while (i/j > 0.0625){
```

```
char str2[]={'P', 'C', 'P', ' ', 'M', 'a', 'j', 'o',
'r', ' ', '2', '5', '/', '1', '1', '/', '2', '0', '2', '4',
'\0'};
int n1, n2;
n1=sizeof(str1)/sizeof(strlen(str1));
n2=sizeof(str2)/sizeof(strlen(str2));
printf("n1=%d,n2=%d",n1,n2);
return 0;}
```

```
j = j + j;
sum = sum + i/j;
printf("%.2f\n", sum);
}
return 0;}
```

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## Part C

Answer all the Questions.

Each question carries *five* marks. (3 Questions x 5 marks = 15 Marks)

Q12.a. What are the various decision making statements. Explain the use of #define and #include directives. (2 marks)

a. Write a program to check whether the entered string is Panagram or not. Draw the flow chart for the same? (Note: A string is said to be Panagram if it contains all English alphabets.) (3 marks)

Q13.a. What are the various categories of functions. How call by value is different from call by reference. (2 marks)

b. Write a program to print Pascal's triangle. (3 marks)

Q14.a Write a program to find the roots of the quadratic equation. (3 mark)

b. Describe jump statements. Explain the use of exit and return keyword in C. (2 marks)