(P1)

① what is the output of the following program. Justify. (1)

```
int &max(int &m, int &n)
{
    return (m>n? m: n);
}
int main()
{
    int m=44, n=22;
    cout << m << ", " << n << ", " << max(m,n);
    cout << "\n";
    max(m,n) = 55;
    cout << m << ", " << n << ", " << max(m,n);
    cout << endl;
    return 0;
}
```

② which of the declarations are legal and which are illegal? Justify your answer. (2)

ⓐ `int &r = n;`

ⓑ `int &r = 44;`

ⓒ `int &r = n++;`

ⓓ `int &r = cube(n);`

Note: n is an int type and cube(n) is a function which returns cube of n.

③ what is the minimum number of iterations that (1)

ⓐ a while loop could make?

ⓑ a do.. while loop could make?

④ Trace the following code fragment, showing the value of each variable each time it changes. Justify. (1.0)

```
int x, y, z;
x = y = z = 6;
x *= y += z -= 4;
```

⑤ Convert the following for loop into a while loop. (1)

```
for(int i = 1; i <= n; i++)
    cout << i*i;
```

⑥ Describe the output of the following program. (1)

```
int main()
{
    for(int i=0; i<8; i++)
     if (i%2==0) cout<< i+1 <<endl;
    else if (i%3==0) cout<<i*i<<endl;
    else if (i%5==0) cout<<2*i-1 <<endl;
    else cout<<i<<endl;
    return 0;
}
```

(7) Describe the output of the following program. (1.5)

```
int main()
{
    for(int i=0; i<8; i++){
    if (i%2==0) cout<<i+1<<endL;
    else if (i%3==0) Continue;
    else if (i%5==0) break;
    cout<<"End of program";
    cout<<"\n"; }
    cout<<"End of Program\n";
    return 0;
}
```

(8) Construct a logical Expression to represent each of the following Conditions. (2)

(a) Score is greater than or equal to 80 but less than 90.

(b) answer is either N or n.

(c) n is even but not 8.

(d) ch is a capital letter.

(9) What is the output of the following program? Justify. (1)

```
int main()
{
    int m, n;
    m = (n = 66) + 9;
    cout << m << " " << n << endl;
    return 0;
}
```

(10) Which of the following are legal statements in C++? Justify. (1)

(a) int x, y;

(b) x + y;

(c) 22;

(11) What is the output of the following program? Justify. (2)

```
int main()
{
    int m = -14, n = 5, q = m/n, r = m%n;
    cout << m << endl;
    cout << n << endl;
    cout << q << endl;
    cout << r << endl;
    return 0;
}
```

(12) what is the output of the following program? (2)

```
int main()
{   int n=5, x;
    x = ++n * --n;
    cout<<n<<", "<<x<<endl;
    cout<<++n<<", "<<++n<<endL;
    return 0;
}
```

(13) Write four different C++ statements that each subtract 1 from the integer variable n. (1)

(14) Write a single C++ statement that substracts the sum of x and y from z and then increments y. (2)

(15) In each of the following, assume that m has the value 5 and n has the value 2 before the statement executes. Tell what the values of m and n will be after the following statements are executed. (2)

a) m *= n++;

b) m += --n;

(16) Evaluate each of the following expressions, assuming in each case that m has the value 24 and n has the value 7. (2)

(a) m % n++

(b) m % ++n

(c) ++m - n--

(d) m += n -= 2.

(17) What is the output of the following program? Justify. (1)

```
int x = 11;
int main()
{
    int x = 22;
    {
        int x = 33;
        cout << x << endl;
    }
    cout << x << endl;
    cout << ::x << endl;
    return 0;
}
```

(18) Is the following Code Correct? Justify. (1)

```
enum Semester { fall, spring, summer};
enum Season { spring, summer, fall, winter};
```

(19) Is the following Code Correct? Justify. (1)

```
enum Week { "MON", "TUE", "WED", "THU" };
```

(20) what is the output of the following program? (1)

```
int main()
{
    for (int m=1, n=8; m<n; m++, n--)
    Cout << "m=" << m << "n=" << n << endl;
    return 0;
}
```

(21) what is the output of the following program? Justify. (1)

```
int main()
{
    double x = 1000/3.0; Cout << x << "\n";
    double y = x - 333.0; Cout << y << "\n";
    double z = 3*y - 1.0; Cout << z << "\n";
    if (z==0) Cout << "z is zero\n";
    else cout << "z is not equal to 0:";
    return 0; }
```

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(22) Describe how a void function with one reference parameter can be converted into an equivalent non-void function with one value parameter. (1)

(23) Write the following min function that uses the min(int, int) function to find and return the smallest of four given integers. (1)

int min(int x, int y, int z, int w).

(24) Write and test the function

void insert(int a[], int &n, int x)

This function inserts the item x into the sorted array a of n elements and increments n. The new item is inserted at the location that maintains the sorted order of the array. (3)

(25) Write and test the function (3)

void reverse(float a[], int n)

This function reverses the array, so that its last element becomes its first, its second-to-last-element becomes its second, etc.

(26) Write and test the function that "rotates" 90° clockwise a two-dimensional square array of ints. For Example: the function transform the array (3)

11	22	33
44	55	66
77	88	99

into array

77	44	11
88	55	22
99	66	33

(27) What is the output of the following code fragment? Justify. (1)

```
int main()
{
    const int *p = new int;
    delete p;
    return 0;
}
```

(28) what is the output of the following program? Justify. (1)

```
int main()
{
    int *p = 0;    // assigned to zero.
    *p = 22;
    cout << "I am here\n";
    return 0;
}
```

(29) which of the following three conditions are true for an array a and an int i; (1.5)

(a) a[i] == *(a+i);

(b) *(a+i) == i[a];

(c) a[i] == i[a];

Justify.

(30) what is the output of the following program?

```
class myclass
{
    int x, y;
};

int main()
{
    myclass ob;
    ob.x = 2;
    cout << ob.x;
    return 0;
}
```

Justify. (1)

(31) What is the output of the following program? Justify. (1)

```
struct mystruct
{
    int x, y;
};

int main()
{
    struct mystruct st;
    st.x = 10;
    cout << st.x;
    return 0;
}
```

NOTE: Assume a space b/w struct & mystruct inside main.

(32) How many constructors can a class have? How many destructors a class can have? (1)

(33) Implement a QUEUE class for holding ints. A Queue is like a Stack except that the items are inserted at one end (called the rear) and removed from the other end (called the front). Include a default Constructor, a destructor and the queue operations insert(), remove(), isEmpty(), isFull(), Count() (returns

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the number of items on the queeee) and print() (which prints the the Content of the queeee). Use an array implementation. (4)

**** * *** ALL THE BEST ********