



UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
SEMESTER II
SESSION 2015/2016**

COURSE NAME : COMPUTER PROGRAMMING II
COURSE CODE : BWA 10403
PROGRAMME CODE : BWA
EXAMINATION DATE : JUNE/ JULY 2016
DURATION : 3 HOURS
INSTRUCTION : ANSWER ALL QUESTIONS

THIS EXAMINATION PAPER CONSISTS OF **SIX (6)** PAGES

Q1 Write segment C++ expressions that are equivalent to the following equations and matrices.

(a) $z = \cos\left(\ln\left(\sqrt{a^2 + b^2}\right)\right)$ (4 marks)

(b) $a = \frac{(\sin(x) - y^3)^2}{(x - y)^2}$ (4 marks)

(c) $z = 5 - \frac{3\sin(x) - x}{(1 + x)^2} + x^3$ (4 marks)

(d) $[c_{ij}] = \sum_{k=1}^p a_{ik} b_{kj}, i = 1, \dots, m, j = 1, 2, \dots, n.$ (5 marks)

(e) Upper triangular matrix, $\begin{pmatrix} a_{11} & a_{12} & a_{13} \\ 0 & a_{22} & a_{23} \\ 0 & 0 & a_{33} \end{pmatrix}$ (7 marks)

(f) Determinant of any matrix A is the product of the diagonal of its reduced upper triangular matrix. Define by

$$|A| = |U| = \prod_{i=1}^n u_{ii}$$

(4 marks)

Q2 Given a declaration of a class as follows:

```
class Ratio
{
public:
    void assign(int a, int b);
    double convert();
    void invert();
    void print();
private:
    int num, den;
};
```

- (a) Determine the name of the class above. (1 mark)
- (b) Determine the members and type of variables involved in the class above. (4 marks)
- (c) Determine the object of a class above. (1 mark)

- Q3** The complete C++ program for each of functions based on the given class in **Q2**, is given as follows:

```
int main()
{ Ratio x;
  x.assign(22,7);
  cout << "x = ";
  x.print();
  cout << " = " << x.convert() << endl;
  x.invert();
  cout << "1/x = "; x.print();
  cout << endl;
  cin.get();
}
void Ratio::assign(int numerator,int denominator)
{
    num = numerator;
    den = denominator;
}
double Ratio::convert()
{
    return double(num)/den;
}
void Ratio::invert()
{
    int temp = num;
    num = den;
    den = temp;
    cout << "den = " << den << endl;
}
void Ratio::print()
{
    cout << num << '/' << den;
}
```

- (a) What is the object of the program above? (1 mark)
- (b) Determine the role of a function `x.assign()`. (2 marks)
- (c) Express the role of a function `x.print()`. (1 mark)
- (d) Identify the role of a function `Ratio::convert()`. (2 marks)
- (e) Determine the role of a function `Ratio::invert()`. (2 marks)
- (f) Determine the purpose of the program (2 marks)
- (g) Determine the output of the program. (3 marks)

Q4 Write a C++ program to solve a problem whose algorithm is given as follows:

```

read input from  $t_i$ ,  $h$ , and  $n$ ;
for  $i = 1$  to  $n$ 
    compute  $(x_i, y_i) = \left( 2t_i^3 \cos(t_i), \frac{t_i}{1 + \cos(t_i)} \right)$ ;
    if  $x_i > y_i$ 
        compute  $z_i = 1 - \sin(x_i y_i)$ ;
        compute  $w_i = \begin{cases} 0, & \text{if } z_i < 0; \\ 1, & \text{if } z_i > 0; \\ -1, & \text{if } z_i = 0; \end{cases}$ 
    else
        compute  $z_i = 1 - \cos(x_i y_i)$ ;
        compute  $w_i = \begin{cases} 0, & \text{if } z_i < 0; \\ 1, & \text{if } z_i \geq 0; \end{cases}$ 
    endif
    display the values of  $t_i$ ,  $x_i$ ,  $y_i$ ,  $z_i$  and  $w_i$ ;
    update  $t_i \leftarrow t_i + h$ ;
endfor

```

By assume the following initial values: $n = 10$, $t_1 = -1$, and $h = 0.1$.

(20 marks)

Q5 Write a complete C++ program to sort the numbers of $a[n+1] = \{15, 6, 14, 9, 11\}$ in ascending order.

(8 marks)

- Q6** Write a complete C++ program to determine the addition and multiplication of two matrices based on the given declarations of a class below.

```
class matrix
{
    int m, n;
    int a[100][100];

public:
    void input();
    void output();
    void addition(matrix, matrix);
    void multiply(matrix, matrix);
};
```

(15 arks)

-- END OF QUESTION --