MINISTRY OF EDUCATION

MANDALAY TECHNOLOGICAL UNIVERSITY

DEPARTMENT OF MECHATRONIC ENGINEERING

First Semester Examination of Second Year

McE 21019 Computer System Architecture and Programming I

Date: 2. 4. 2018. Time: 1:00 pm To 4:00 pm

Answer **ALL** Questions.

1. (a) What is the output of the following C++ code? (5 marks)

```
int i, j;
for( i=0; i <= 6; i++)
{
   for(j = i+1; j <= 7; j++)
   cout<< j;
   cout<<endl;
}
```

1. (b) The following C++ statements are valid or not? If valid write **VALID**. If not **NOT VALID**. (5 marks) num2 and num1 are integers.

(i) *int percent = 10%;* (ii) *int one = 5;* (iii) *char letter = D;*

(iv) *string message = 'First test is on Monday';* (v) *num2 = num1 % 2.0;*

(vi) num1 * 2 = newNum + num2; (vii) *y *= 2 *x + 5 - z;* (viii) *x = 12 * num1;*

(ix) *int two=4, three=1;* (x) *num1 = 5; num2 = 2 + num1; num1 = num2 / 3;*

1. (c) Write a program that prompts the user to enter first name, last name, and working hour. The constant pay rate is 27.46. Write the C++ output statements that produce the following output style: (10 marks)

```
Name …….: Rainbow Smith
Pay Rate…….....: $      27.46
Hours Worked…….....:       21.50
Salary…….....: $    590.39
```

2. Write a program that they prompt the user to input the shape type (rectangle for 1, circle for 2, and cylinder for 3) and the appropriate dimension of the shape. The program then

outputs the following information about the shape: For a rectangle, it outputs the area and perimeter; for a circle, it outputs the area and circumference; and for a cylinder, it outputs the volume and surface area. **Using switch structure for selection.** For circle: area=πr^2 and circumference=$2\pi r$. For cylinder: volume=$\pi r^2 h$ and surface area=$2\pi rh+2\pi r^2$ (20 marks)

3. (a) Suppose that classStanding is a char variable, and gpa and dues are double variables. Write a selection control structure statements expression that assigns the dues as following: If classStanding is 'f', the dues are $150.00; if classStanding is 's' (if gpa is at least 3.75, the dues are $75.00; otherwise, dues are 120.00); if classStanding is 'j' (if gpa is at least 3.75, the dues are $50.00; otherwise, dues are $100.00); if classStanding is 'n' (if gpa is at least 3.75, the dues are $25.00; otherwise, dues are $75.00). (Note that the code 'f' stands for first year students, the code 's' stands for second year students, the code 'j' stands for juniors, and the code 'n' stands for seniors.) (8 marks)

3. (b) The following program randomly generates an integer greater than or equal to 0 and less than 100. The program then prompts the user to guess the number. If the user guesses the number correctly within 10 tries, the program outputs an appropriate message such as ‘You win!’. Otherwise, the program checks whether the guessed number is less than the random number. If the guessed number is less than the random number generated by the program, the program outputs the message ‘Your guess is lower than the number. Guess again!’; otherwise, the program outputs the message ‘Your guess is higher than the number. Guess again!’. The program then prompts the user to enter another number but the user has no more than 10 tries to guess the correct number. If the user do not guess within 10 tries the program should print ‘You lose!’. (12 marks)

4.(a) Write a program that calculates how much money you’ll end up with if you invest an amount of money at a fixed interest rate, compounded yearly. The user enter the initial amount, the number of years, and the yearly interest rate in percent. The program output is some interaction with the program might look like this:

Enter initial amount: 3000
Enter number of years: 10
Enter interest rate (percent per year): 5.5

At the end of 10 years, you will have 5124.43 dollars.

Note: At the end of the first year you have 3000 + (3000 * 0.055), which is 3165. At the end of the second year you have 3165 + (3165 * 0.055), which is 3339.08. Do this as many times as there are years. Use for loop makes the calculation. (15 marks)

4. (b) Rewrite the following as a **for loop**. What is the output of this loop? (5 marks)

```
int num = 1;
while (num < 10)
{
  cout << num << " ";
  num = num + 2;
}
cout << endl;
```

5. You found an exciting summer job for five weeks. It pays, say, $15.50 per hour. Suppose that the total tax you pay on your summer job income is 14%. After paying the taxes, you spend 10% of your net income to buy new clothes and other accessories for the next school year and 1% to buy school supplies. After buying clothes and school supplies, you use 25% of the remaining money to buy savings bonds. Your parents buy additional savings bonds for you as follows:
   i. If you do not spend any money to buy savings bonds, then because you had a summer job, your parents buy savings bonds for you in an amount equal to 1% of the money you save after paying taxes and buying clothes, other accessories, and school supplies.
   ii. If you spend up to 25% of your net income to buy savings bonds, your parents spend $0.25 for each dollar you spend to buy savings bonds, plus money equal to 1% of the money you save after paying taxes and buying clothes, other accessories, and school supplies.
   iii. If you spend more than 25% of your net income to buy savings bonds, your parents spend $0.40 for each dollar you spend to buy savings bonds, plus money equal to 2% of the money you save after paying taxes and buying clothes, other accessories, and school supplies.

   Write a program that prompts the user to enter the pay rate for an hour and the number of hours you worked each week. The program then outputs the following:
   a. Your income before and after taxes from your summer job.
   b. The money you spend on clothes and other accessories.
   c. The money you spend on school supplies.
   d. The money you spend to buy savings bonds.
   e. The money your parents spend to buy additional savings bonds for you.

********** End Of Questions **********