

**Information and Computer Science Department**

**Spring Semester 132**

**ICS 103 – Computer Programming in C**

**Midterm Exam key**

**Thursday, April 03, 2014**

**Duration: 120 minutes**

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| **Instructor:** |  |

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| **Question #** | **Maximum** **Grade** | **Obtained** **Grade** |
| **1** | 4 |  |
| **2** | 12 |  |
| **3** | 36 |  |
| **4** | 15 |  |
| **5** | 10 |  |
| **6** | 8 |  |
| **7** | 15 |  |
| **Total** | **100** |  |

**Question # 1 [4 points]**

Fill in the circles with the software used in developing a high-level language program:



**Question # 2 [12 points]**

Apply the software development method to find the volume and surface area of a sphere given its radius.

$volume=\frac{4}{3}πr^{3}$ $surface area=4πr^{2}$ , where r is the radius and π=3.14159

Note: Apply the first four steps ending with a complete C program.

**Question # 3 [36 points]**

Identify the error(s), if any, in each of the following code fragments. If a fragment has no errors, write its output. [Note: No explanation of error(s) is required].

| **Code Fragment** | **Output** |
| --- | --- |
| int x = 3;x = x \* x – x / x;printf("%d", x); |   |
| int a, b, c, x;x = 1;a = 77;b = 10;c = 11;x = a % b;printf("%d ", x);x = a / b;printf("%d ", x);x = b % a;printf("%d ", x);x = b / a;printf("%d ", x); |   |
| double x=1234.5678;int y=77; printf("%.1f%d\n", x, y);printf("%1.1f%2d\n", x, y);printf("%4.2f%3d\n", x, y);printf("%7.3f%4d\n", x, y);printf("%9.3f%4d\n", x, y); | 5 marks

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| double x = 10.4, y; int m = 2 , n = 7 ;y = x / m;printf("%.1f\n", y);y = n / m;printf("%.1f\n", y); |  |
| int x = 12;if(x > 5) printf("A");if(x > 6) printf("B");if(x > 12) printf("C");else if(x > 8) printf("D");else if(x > 4) printf("E");else printf("F"); |  |
| int x = 10;if (x > 15) x = 0; printf(“%d”, x);else printf(“%d”, x + 5); |  |
| int x;scanf(“%d”, &x);switch(x){case 1: x = x + 1; break;case 3: x = x + 2;case 5: if(x == 4) x = x + 6;case 6: x = x + 3; break;default: x = x – 1;}printf(“%d”, x); | 3 marks When x is 1When x is 2When x is 3 |
| int i, j;i = 3;while (i < 7){ for(j = 5; j >= i; j = j-2) { printf("%d ", i + j); } printf("\n"); i = i + 3;}printf("%d %d\n", i, j); | 4 marks |
| int i,j,count = 0; for(i = 3; i != 5; i +=2)  for(j = 3; j > i; j = j-2)  count++;printf("%d %d %d\n", i, j,count); | 3 marks |
| int i, j;for (i = 1; i <= 5; i++){ for (j = 1; j <= i; j++) printf("%d",j); for (j = i; j <= 5; j++) printf("%d",j); printf("\n");} | 5 marks |
| #include <stdio.h>int f1(int x);int main(){ int k = 1,m = 6; printf("%d %d \n",f1(k),f1(m)); return 0;}int f1(int x){ if (x <= 2) return 2; else return 2\*(x-1);} | 4 marks |

**Question # 4 [15 points]**

In each semester, a private University charges 2000 Saudi Riyals per course for each of the first four courses a student takes. For each course in excess of 4, the charge is 1500 per course. Write a C program that prompts for and reads the number of courses a student takes in a semester; it then displays the total charge to be paid. Your program must display an appropriate error message if the entered number of courses is zero or negative.

Sample program runs:

|  |
| --- |
| 01.jpg |
| 2.jpg |

Note: Your program must be general and not specific to the given sample runs.

**Question # 5 [10 points]**

Write a C program that asks the user to enter an integer number n and displays the multiplication table for numbers 1 to n. Display each number in 3 places. The output of your program should be as follows for n = 5:



**Question # 6 [8 points]**

Write a C program that computes the following sum based on the value of x input by the user.

$$sum=\sum\_{i=1}^{i=10}\frac{x^{i}}{2i-1}$$



**Question # 7 [15 points]**

The body mass index **(BMI)** is a measure for human body shape based on an individual's weight and height. It is a simple method to assess how much an individual's body weight departs from what is normal. It can be measure by the formula:

**BMI = (weight in kg) / (heightin m)2**

Depending on the value of BMI, a person can be categorized in different weight ranges as given in the table below.

|  |  |
| --- | --- |
| **BMI (kg/m2)** | **Weight Range** |
| Less than 18.5 | Underweight |
| From 18.5 to 24.9 | Normal |
| From 25 to 29.9 | Overweight |
| 30 and more | Obese |

Write a complete C language program using a function **bmi\_calc** to calculate BMI. Ask the user about height and weight in the main function. Print a message to the user showing him weight in kg, height in m, BMI and the weight range category as shown in the image.

 