

**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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| **Name:** |  |

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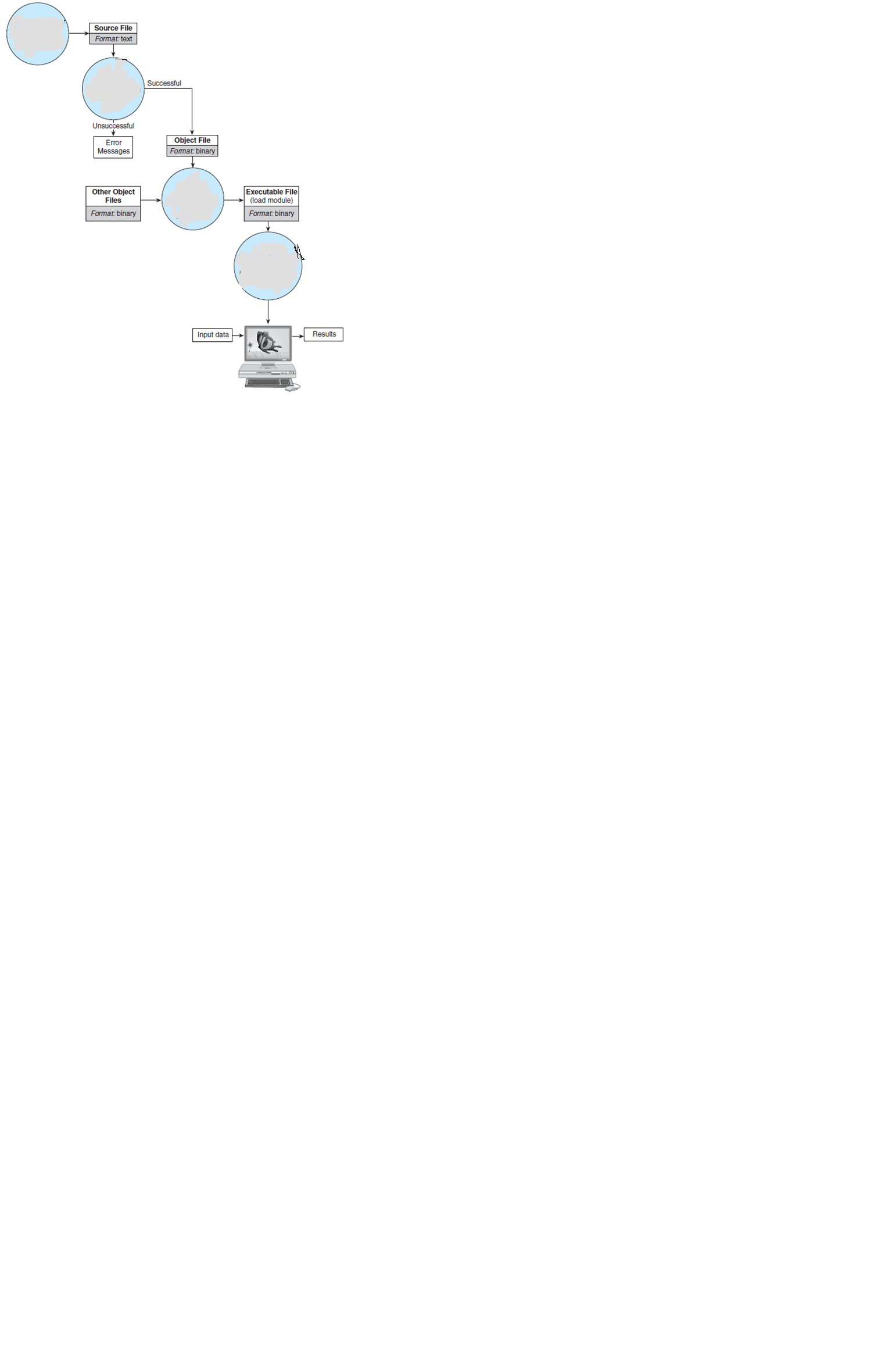
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| **Section#:** |  |

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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.

, 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   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |
| 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 1  When x is 2  When 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.

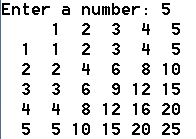
Sample program runs:

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

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

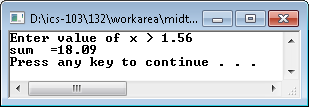
**Question # 5 [10 points]**

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.



**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.