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Department of Computer Science & Engineering

Begum Rokeya University, Rangpur

Semester Final Examination-2014   1st year 2nd Semester   Year Session: 20013-2014

Course Title: Basic Electronics   Course Code: EEE 1221

Time: 3.0 Hours   Full Marks: 50

[N.B. *Answer any Five (5) Questions, Number of each question is indicated to the right*]

1. (a)	Why semiconductor is an insulator at ordinary temperature?	2
(b)	Why silicon is preferred over germanium as semiconductor devices?	3
(c)	Give the mechanism of hole current flow in a semiconductor. Why number of electrons and holes are equal in intrinsic semiconductor?	3+2=5
2. (a)	What do you mean by dc and ac resistance of a semiconductor diode? How you determine them from the V-I characteristics of a semiconductor diode?	2+2=4
(b)	What is ripple factor? Drive an expression for efficiency of a center taped full wave rectifier.	1+5=6
3. (a)	Give the name of different semiconductor diodes with their symbols.	3
(b)	What is zener diode? Explain how and how zener diode used as a voltage regulator?	1+3=4
(c)	Explain why need filter at the output of a rectifier?	3
4. (a)	Draw the symbol of npn and pnp transistor and show the current flow direction in them.	1+2=3
(b)	How you draw the dc load line on the output characteristics of a transistor? What is its importance?	3+1=4
(c)	Show that α is always less than unity.	3
5. (a)	Mention the essentials of transistor biasing circuit.	2
(b)	What are the various transistor biasing methods?	2
(c)	Describe the potential divider biasing method for transistor. How stabilization of operating point is achieved by this method.	5+1=6
6. (a)	Write down the difference between JFET and MOSFET.	2
(b)	Draw the symbols of different types of JFET and MOSFET.	2
(c)	Explain the construction and working principle of enhancement type MOSFET.	3+3=6
7. (a)	What are the characteristics of an ideal Op-Amp?	2
(b)	Drive expressions for voltage gain for inverting and non-inverting Op-Amp.	3
(c)	Explain Op-Amp as (i) summing amplifier; (ii) differential amplifier; and (iii) integrator amplifier.	5

Department of Computer Science and Engineering
Begum Rokeya University, Rangpur.
1st Year 2nd Semester Final Examination, 2014. (Session: 2013-14)

Course Title: Chemistry
Course Code: CHM 1224

Full Marks: 50

Answer Any Five from the Given Question
(Numbers in the right margin indicate marks for each Questions)

1. (a) Describe Rutherford's model of Atom. How was it improved by Bohr? — 5

   (b) What do you understand by the dual character of matter? Derive an expression for the wavelength of matters. — 3

   (c) What do you understand by the term "quantum number"? How many quantum numbers has an electron in an orbital? — 2

2. (a) What is periodic law? Give a brief account of modern features of modern periodic table. — 5

   (b) Give a concise statement of the first law of thermodynamics. Deduce its mathematical form and explain the terms involved. — 3

   (c) Explain giving reason "The net entropy of the universe tends to increase". — 2

3. (a) Describe the construction of a simple electrochemical cell. Indicate the +ve and –ve electrodes. What are the reactions taking place at this electrodes? — 5

   (b) What do you understand by the first order reaction? Drive an expression for the rate constant of first order reaction. — 3

   (c) Calculate half life period for the first order reaction whose rate constant is 1.502×10^{-3} sec^{-1}. — 2

4. (a) Discus briefly the valence bond theory of covalent bond. — 5

   (b) Bring out the basic concepts of UV – VIS spectroscopy. — 3

   (c) Define primary and secondary valency with example. — 2

5. (a) What is complex compound? Find the coordination number of the metal ion in the following complexes: $[Fe(CN)_2(NH_2)_2]SO_4$, $[Cr(H_2O)_6]Cl_3$, $[Cu(NH_2)_4]SO_4$ — 1+3=4

   (b) Name the following complexes: $[Cr(H_2O)_4]NO_3$, $[Fe(CN)_2(NH_2)_4]NO_3$, $K3[Co(CN)_6]$, $K_3[Fe(CN)_6]$. — 4

   (c) What is chelate effect? — 2

6. (a) Describe the mechanism of the SN_2 and SN_1 reactions. — 5

   (b) What do you mean by polymerization? Discuss the polymerization step of chain reaction. — 3

   (c) Distinguish between electrophilic and nucleophilic. — 2

7. Write short notes on the following topics(any four): — 2.5×4=10

   (a) Crystal field theory

   (b) Molecular Orbital theory

   (c) Environmental aspects of metal

   (d) Aufbau principle

   (e) Photochemical reactions

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Department of Computer Science and Engineering
Begum Rokeya University, Rangpur
1st Year 2nd Semester Final Examination - 2014 (Session: 2013-14)
Full Marks: 50   CSE 1201: Structured Programming   Time: 3 Hours

[Answer any **five** questions of the following. Each question carries a total of 10 marks]

(2) 1. (a) Briefly explain the concept of *call by value* and *call by reference* (C context).

(3)   (b) Little Babu likes to find pattern in numbers. Now he is trying to find the next
              number in the following sequence: $2, 4, 8, 16, 32, 64, \ldots$. Easy to find, isn't it? Help
              babu to write a C function that takes an integer number, N and returns 1 if N is
              a number from the sequence babu is observing; returns 0 if N is not. The function
              prototype follows as:

              `int is_in_the_sequence(int N);`

              Write the function definition as your answer. Your function should also run in
              constant time complexity: $O(1)$.

(5)   (c) Write a C function named `compute()` that returns the result of the sum

$$\sum_{i=0}^{2} \sum_{j=0}^{3} (2i + 3j)$$ and also mention the value that will be returned by `compute()`.

(4) 2. (a) Define Run Time Error (RTE). Mention when the following code segments may
              generate RTE (C context). Also mention how can you avoid them. Assume that
              there are no compile errors.

              (i) `x = sqrt(i);` (ii) `sum = sum + n/i;` iii) `int a[1000000001];`
              (iv) `memo [ lookup[k] ] = x; // lookup[k] < length of memo`

(2)   (b) When does a loop iterate indefinitely? Briefly explain with examples.

(4)   (c) Write a non-recursive version of `void printd(int n);` that does the same as
              the recursive one given below.

```
void printd(int n){
  if( n < 0) {
    putchar('-');
    n = -n;
  }
  if( n / 10)
    printd(n / 10);
  putchar(n % 10 + '0');
}
```

(2) 3. (a) Determine True/False:

              i. C was originally designed for and implemented on the UNIX operating system.
              ii. Writing `if ( ~ a)` is equivalent to writing `if ( !a)` .

(2)   (b) Write a topological ordering (activity x comes before activity y) of the following
              activities related to compiling C programs.

              `<source file (.c)> , < executable files (.exe)>, <object files (.o) >,`
              `< headers (.h) >`

(2)   (c) What will be the output of the following c program?

```
#include <stdio.h>
#define real float
int main(){
int a, b;
real f;
a = 227, b = 13; f=a/b; printf("%0.1f\n", f);
}
```

(2)   (d) Distinguish between 'A' and "A" (C context).

(2)   (e) How many times "Little Babu" will be printed in the following program.
```
he = ((168 % 12) == 0 ) ? -7 : -14;
she = 11;
while ( he < 0 && she){
        printf("Little Babu\n");
        he--;
        she--;
}
```

(3) 4. (a) Little babu is very much inspired to code after watching the video Learn to Code and realizes the importance of programming in todays technology driven world. So he is very determined to master coding. He has already learned a lots of coding stuffs of C programming language. But, due to overload in learning within short period of time , he is stuck with a problem: How to split/separate the words in a single space separated line of text ? Because he needs to print the words reversed in their position. For example, **Hello world** should be printed as **olleH dlrow**. He vividly remembers there is a C library function to split the words , but has forgot it. Now your task is to help him. Write a C program that prints a given sentence as explained above.

(1)   (b) What will be the output of the following C code.
```
#include<stdio.h>
int main() {
   int i;
   for(i=0;i<=5;i++);
       printf("%d",i)
   return 0;
}
```

(1)   (c) Define static and register variables.

(5)   (d) Observe the following C function and then rewrite the function so that it contains only one loop (to make it faster to run in $O(n)$). (2.5 Marks) Optimize it more so that it does avoid any loops, more faster $O(1)$ (2.5 Marks)

```
unsigned long long little_babu(int N){
    int i, j;
    unsigned long long s;
    sum = 0;
    for (i = 1; i <= N; i++){
        for (j = 1; j<= i; j++ ){
            s+= j;
        }
    }
    return s;
}
```

(3) 5. (a) What is a C structure? One representation of a rectangle is a pair of points that denote the diagonally opposite corners. Say they are pt1 and pt2.

```
struct rect {
    struct point pt1;
    struct point pt2;
};
```

The rect structure contains two point structures. In a standard form of the rectangle, the pt1 coordinates are less than the pt2 coordinates. Assuming that a rectangle R may not be in a standard form (that is we are not sure if the pt1 coordinates are less than the pt2 coordinates), write a C function

```
 struct rect makeStandardRect( struct rect R )
```

that returns a rectangle guaranteed to be in standard from.

(3) (b) Consider this naive macro `#define MAX(a,b)  a>b?a:b` and the code

```
i = MAX(2,3)+5;
j = MAX(3,2)+5;%8,
```

After the execution, what might be the values of i, j? If it was intended that after execution the value will be 8 for both i and j, then define the `MAX(a,b)` macro appropriately to get the desired result.

(4) (c) A subset of a set is a set that contains all or some of the elements of that set. For example if the set is $3, 5, 7$, then some of its subsets are   the empty set, $3, 7, 5, 7, 5$ and $3, 5, 7$ the original set.If the original set has n elements then it will contain 2^n subsets .Write a C program that prints all the subsets of the following given set $A = 2, 3, 5, 7, 9$ (Hint: Represent the set into the following array, `intA[]=2,3,5,7,9`)

(3) 6. (a) What is the C Preprocessor? Explain with examples.

(2) (b) What is an interactive debugger? What special features are made available by a debugger?

(4) (c) Write a function `rightrot(x,n)` that returns the value of the integer   x rotated to the right by n bit positions.

(1)   (d) Write a C program that prints the area of a circle. You should take radius R as input and also derive the value of π from the relation: $\cos\pi = -1$ to use it in your program.

(1) 7. (a) Consider the array subscript adapted version of the library function `strcpy:` that copies t to s:

```
void strcpy(char *s, char *t){
    int i;
    i = 0;
    while ( (s[i]=t[i]) != '\0' )
        i++;
}
```

Write a pointer version of `void strcpy(char *s, char *t)`.

(3)   (b) Write a program that will calculate the sum of every third integer , beginning with $i = 2$ for all values of i that are less than 100. Write the loop three different ways.

   i. Using a **while** statement

   ii. Using a **do-while** statement

   iii. Using a **for** statement

(6)   (c) Write short notes on the following library functions: i) `memset()` ii) `malloc()` iii) `qsort()`

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1st Year 2nd Semester Final Examination, 2014. (Session: 2013-14)

Course Title: Differential and Integral Calculus

Course Code: MAT 1223

Time: 3.00 Hours

Full Marks: 50

Answer Any Five from the Given Question
(Numbers in the right margin indicate marks for each Questions)

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1. (a) Define limit and continuity. — 3

   (b) Show that, $\lim_{x \to 2} \frac{2x^2-8}{x-2} = 8$; applying (δ, ε) definition find δd if $\varepsilon = 1$. — 3

   (c) A function f(x) is defined as follows: — 4
   $$f(x) = \text{-x when x} \leq 0$$
   $$= x \text{ when } 0 < x < 1$$
   $$= 2\text{-x when x} \geq 1$$

   Determine the continuity of the function f(x) at x = 0 and x = 1.

2. (a) Show that, the slop of the tangent of the function y = f(x) at (x, y) is $\frac{dy}{dx}$. — 5

   (b) Find the nth derivative of $\frac{x^2}{(x+2)^3}$. — 5

3. (a) Find the critical points of $f(x) = x^{\frac{1}{3}}(x + 4)$. Comment whether they are stationary points or not. Find the maximum value of the function. — 5

   (b) Find the nth derivative of $e^{ax} \sin bx$. — 5

4. (a) Find y_3 if $y = e^{\frac{1}{x}}$. Show that $(1 - x^2)y_{n+2} - xy_{n+1}(2n + 1) - (n^2 + a^2)y_n = 0$ when $y = e^{a \sin^{-1} x}$. — 5

   (b) State and Prove the Rolle's theorem. — 5

5. (a) Find the Taylor series for $f(x) = \frac{1}{x^2}$ about x = -1. — 5

   (b) Find the area bounded by the parabolas $y = 6x - x^2$ and $y = x^2 - 2x$. — 5

6. (a) State and prove the fundamental theorem of calculus. — 5

   (b) Find the area of the surface that is generated by revolving the portion of the curve $y = x^2$ between x=1 and x=2 about y-axis. — 5

7. (a) Prove that, $\int_0^{2a} f(x)dx = 2 \int_0^a f(x) dx$ if, $f(2a - x) = f(x)$. — 5

   (b) Evaluate, $\int \frac{2x^2-1}{(4x-1)(x^2+1)} dx$ — 5