Department of Compute Science and Engineering
Begum Rokeya University, Rangpur.
1st Year 2nd Semester Final Examination −2013   Session: 2012−13
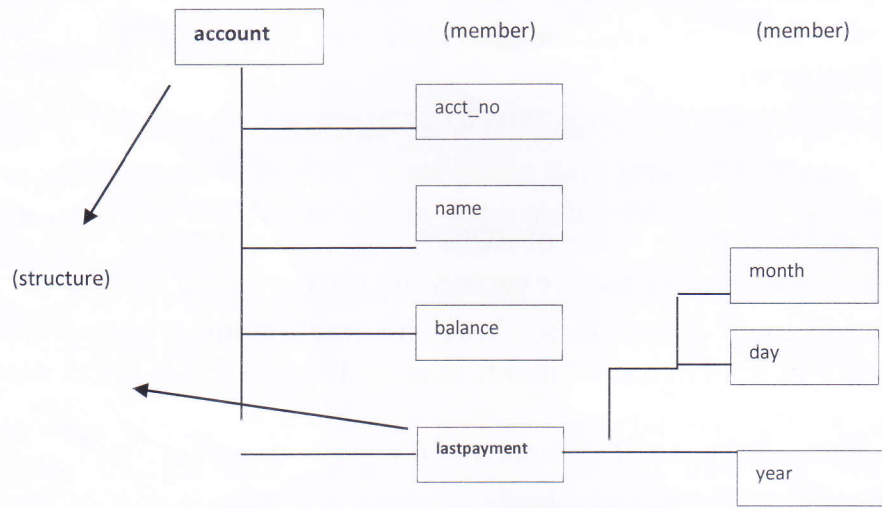
Course Title: Structured Programming
Full Marks: 50   Course Code: CSE 1201
Time: 3 Hours

Answer any FIVE from the Following Questions

(Note: Numbers in the right margin indicate marks for each question.)

1. (a) In banking software, an account is associated with various attributes. The   5
composition of such account is illustrated schematically in the following figure.

This account can be defined as a structure in C programming. Now, answer
the following questions−
(i) Write the definition of this account (illustrated above) using proper data
types for each member. Also define the nested **lastpayment** structure
properly.
(ii) You are given an array of 100 accounts of this type, say **account
list[100]** , write a C program to display the names of the accounts with
minimum and maximum balance

(b) Write a C program to build a rudimentary calculator. (**For full marks:** Process   4
the input until EOF (End of File), and use **swtich** case)
Instructions:
- Input two integer number **a, b** and a character **c,** the value of c only
  any of the these {+,−,*,/}
- Output the result after performing summation, or subtraction or
  multiplication or division between a and b (a+b, or a − b or a*b or a/b)
  according to the input character c.

Sample Input	Sample Output
2 3 +	5
123 125 −	−2

(c) Write a function **isPowerofTwo(n)** that returns 1 if n is a power of two, 0   1
otherwise. Use bit manipulation for full marks.

2.

2. (a) We specify the data type of a variable when declaring them at the beginning of a C program. When we declare a variable as **integer**, usually 4 bytes (32 bit) are allocated in the memory for that variable. Hence, we can store any value within the following range $[-(2^{31}+1),+(2^{31}-1)]$, briefly explain why, instead of 32 bits, only 31 bit is used. How can you modify the basic data types to extend their limits? — 2

(b) What do the C library functions **memset()** and **strtok()** do? Explain briefly with examples. What's their header file? — 3

(c) Write a recursive function **isPalindrom(char *s)** that returns 1 if string s is a plaindrom, 0 otherwise. — 3

(d) *"Pointers are sometimes the only way to express a computation"* justify this quote. — 2

3. (a) Write a program to print the value of EOF. — 1

(b) Write a function **reverse(s)** that reverses the character string s. — 2

(c) What is a nested loop? When is a "switch" statement preferable over an "if" statement? In a switch statement, what will happen if a break statement is omitted? — 3

(d) What are the different types of control structures in programming? — 1

(e) What are static and register variables? — 2

(f) What will be the output of the following C code. — 1

```
#include<stdio.h>
int main(){
    int i;
    for(i=0;i<=5;i++);
    printf("%d",i);
    return 0;
}
```

4. (a) 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 2n subsets.Write a C program that prints the sums of all subsets of the following given set A={2,3,5,7,9} (Hint: Represent the set into the following array, int A[] = {2,3,5,7,9}) — 4

(b) Consider the statement
double ans = 18.0/squared(2+1);
For each of the four versions of the function macro squared() below, write the corresponding value of ans.
   1.   #define squared(x) x*x
   2.   #define squared(x) (x*x)
   3.   #define squared(x) (x)*(x)
   4.   #define squared(x) ((x)*(x))
Consider int val=0xCAFE; Write expressions using bitwise operators that do the following: — 4

- test if atleast three of last four bits (LSB) are on
- reverse the byte order (i.e., produce val=0xFECA)

(c) What is the difference between the & and && operators and the -> and . operators?

5 (a) What will be printed by the following code?   2

```
void main()
{
    unsigned int x;
    int b;
    x = 29;
    for (b = 0; x != 0; x >>= 1)
        if (!(x & 01))
            b++;
    printf("%d\n", b);
}
```

(b) What is symbolic constant? In a C program, a symbolic constant is defined   2
like: #define EPS 1e−12, what is the data type of this constant?

(c) How can you build a dynamic data structure (unlike array) using C struct?   3
Explain.

(d) Write a C program to determine the ranges of **char, int, float, double, long**   3
double, long int (both signed and unsigned).

6 (a) The unusual aspect is that ++ and −− may be used either as prefix operators   1
(before the variable, as in ++n), or postfix operators (after the variable:
n++). In both cases, the effect is to increment n. Then what is the difference
between these two operators?

(b) What are the difference between pointers and array?   2

(c) Who is the inventor of C? Write a simple C program and explain its different   2
parts.

(d) How can you avoid the use of goto in C programming? Explain your answer   2
with examples.

(e) What do you know about compile time error and run time error?   2

(f) What will be the output of the following code: 1

```
#include
int main()
{
        int const *p=5;
        *p=*p+10;
        printf("%d",*p);
        return (0);
}
```

7 (a) It is often useful to relate Polar and Cartesian coordinate systems. Consider   4
the following figure.
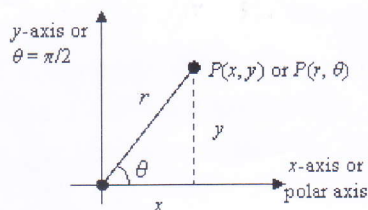
By the Pythagorean Theorem, we have that $x^2 + y^2 = r^2$. And using the basic properties of right triangles, we also have $x = r\cos(\theta)$, $y = r\sin(\theta)$ and $\tan(\theta) = y/x$. Write a complete C program to convert a polar coordinate $P(r,\theta)$ to its corresponding Cartesian coordinate $P(x,y)$. [Assume, r, θ are double type and the value of θ is in degree. So beware about using trigonometric function in C, arguments must be passed in radian while using a trigonometric function.]

Note: *input*— value of r, θ (theta), *output*— value of corresponding x,y.

(b) Explain macro substitution with examples.   2

(c) Write the program expr, which evaluates a reverse Polish expression from the   4
command line, where each operator or operand is a separate argument. For
example,

expr 2 3 4 + *

evaluates 2 * (3+4).

Department of Computer Science & Engineering

Begum Rokeya University, Rangpur

Semester Final Examination-2013   1st year 2nd Semester   Session: 20012-2013

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)	What are the demerits of intrinsic semiconductor?	2
(b)	Explain how we can increase current carrier in p-type and n-type intrinsic semiconductors?	3
(c)	Draw the energy diagram of p-type and n-type semiconductors and write down the difference between above two type semiconductors.	2+3=5
2. (a)	Define diode biasing. Explain the action of the different biasing voltage applied to the p-n junction.	1+3=4
(b)	Draw the characteristic curve of p-n diode and explain its different regions.	1+2=3
(c)	Define breakdown voltage, knee voltage and zener voltage.	3
3. (a)	Write down the name of different types of diode with their symbols.	3
(b)	Write the different applications of diode. Explain how diode can use as a rectifier.	2+2=4
(c)	An ac voltage of peak value 15 V is connected in series with a silicon diode and load resistance of 560Ω. If the forward resistance of the diode is 22Ω, calculate (i) peak current through diode, (ii) peak output voltage.	3
4. (a)	Explain the construction of transistor. Show the current flow direction in pnp and npn transistor with proper diagram.	2+2=4
(b)	Explain why collector current always less than emitter current in a transistor.	3
(c)	Define I_{CBO} and I_{CEO}. How are they different? How are they related?	3
5. (a)	Define Q-point and stability factor for transistor. How you draw the dc load line of transistor, explain with proper diagram.	2+3=5
(b)	Write the merits and demerits of different transistor biasing techniques.	3
(c)	What is thermal runaway in transistor? How it can be avoided?	2
6. (a)	Write down the difference between BJT and FET. Classify the FET.	2+2=4
(b)	Explain the construction and working principle of enhancement type MOSFET.	6
7. (a)	Write the important characteristics of Op-amp. Define CMRR of Op-amp.	2+1=3
(b)	How Op-amp used as an inverting and non-inverting amplifier.	2
(c)	Show the different application of Op-amplifier with proper circuit diagram.	5

Department of Computer Science and Engineering
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1st Year 2nd Semester Final Examination, 2013 (Session: 2012-13)

Course Title: Differential and Integral Calculus
Course Code: MAT1223

Full Marks: 50

Answer Any Five from the Given Questions

(Note: Numbers in the right margin indicate marks for each question.)

1. (a) Define monotonically increasing function. Show that $f(x) = \frac{x}{x+1}$ is monotonically increasing when $x > 0$. **6**

   (b) Find the domain and range of the function $f(x) = |x| + |x - 1|$ **4**

2. (a) State and prove L.Hospitals theorem. Show that $\lim_{x \to 0}(1 + x)^{1/n}$ exists. **7**

   (b) Find $\frac{dy}{dx}$ for $2 \tan^{-1}\sqrt{\frac{x-a}{b-x}}$. **3**

3. (a) Prove that every differentiable function is continuous but the converse is not necessarily true. **6**

   (b) If $f(x) = \left(\frac{a+x}{b+x}\right)^{a+b+2x}$, show that $f'(0) = \left(2\log\left(\frac{a}{b}\right) + \frac{b^2-a^2}{ab}\right)\cdot\left(\frac{a}{b}\right)^{a+b}$ **4**

4. (a) Define maxima and minima of a function. Find the maximum and minimum values of u where $u = \frac{4}{x} + \frac{36}{y}$ and x + y=2. **6**

   (b) Verify that the hypothesis of the mean value theorem are satisfied on the given interval and find all values of 'c' in that interval that satisfy the conclusion of the theorem. $f(x) = x^2 + x;\ [-4, 6]$ **4**

5. (a) $\int \frac{dx}{a + b\cos x}$ **4**

   (b) Answer any two: **6**

   (i) $\int \frac{(a+bx)^2}{(a'+b'x)^3}\, dx$

   (ii) $\int \cos\left(2\cot^{-1}\sqrt{\frac{1-x}{1+x}}\right)dx$

   (iii) $\int \frac{dx}{1+3e^{-x}+2\,e^{2x}}$

6. (a) State and prove fundamental theorem of integral calculus. **5**

   (b) $\int_0^1 x\,(\tan^{-1}x)^2\, dx$ **5**

7. (a) Find the area about the x-axis included between the parabola $y^2 = ax$ and the circle $x^2 + y^2 = 2ax$ **5**

   (b) Answer any two: **5**

   (i) $\int_0^1 \frac{\log(1+x)}{1+x^2} = \pi/2 \log 2$

   (ii) $\int_0^\pi \frac{x\tan x}{\sec x + \tan x}\,dx$

   (iii) $\int \frac{1}{(2x+1)\sqrt{4x+3}}\, dx$

Course Title: Chemistry

Course Code: CHM 1224

Full Marks: 50
Time: 3 Hours

Answer Any Five from the Given Questions

(Note: Numbers in the right margin indicate marks for each question.)

1. (a) What do you mean by Quantum number? Explain four quantum numbers with their significance. — 1+4=5

   (b) Draw the shapes of p and d orbital showing proper signs of the lobes. — 2

   (c) Write down the values of all the azimuthal and magnetic quantum numbers for the principle quantum number n=3. — 3

2. (a) Define the following terms:
   Entropy, Gibbs free energy, chemical potential and phase. — 4

   (b) Discuss the physical significance of entropy. — 2

   (c) Two moles of an ideal gas at $27^{\circ}C$ expand reversibly and isothermally from 4×10^{-2} m^3 to 8×10^{-2} m^3. Calculate the entropy change for the gas. — 4

3. (a) What do you mean by galvanic cell? Describe the construction and working of Daniel cell. — 5

   (b) Discuss the physical significance of the following electrochemical cells: — 2

   i)$Zn|Zn^{2+}(0.001M)||Ag^{+}(.1M)|Ag$

   ii)$Fe|FeSO_4(aq)||H_2SO_4|H_2$, pt

   (c) Why Be_2 does not exist? Explain this with molecular orbital theory. — 3

4. (a) Define the term 'Solubility' and 'Solubility product'. The solubility of $BaSO_4$ is 2.33×10^{-4} g per cc at $25^{\circ}C$. Calculate the solubility product of $BaSO_4$ assuming that the dissolved salt is completely ionized. — 2 +3.5

   (b) Discuss the factors which influence the solubility. — 2.5

   (c) What are the differences between dark and photochemical reactions? — 2

5. (a) What do you mean by order and molecularity of a reaction? Give example. — 2.5

   (b) Use the following data to show the reaction $CH_2COOC_2H_5 + NaOH \rightarrow CH_3COONa + C_2H_5OH$ is second order reaction. Initial concentration of $CH_3COOC_2H_5 = NaOH = 10$ $molL^{-1}$ — 6.5
   Time(min): 0 15 25 35 55
   (a-x) $molL^{-1}$: 10 4.9 3.6 2.9 2.1

   (c) What are ligands? Discuss different types of ligands. — 3.5

6. (a) Write down the electronic configuration of following species: — 3
   i)Cr,Cr^{3+} ii) Fe, Fe^{2+} iii) Cu, Cu^{2+} .

   (b) Write down the mathematical term of de Broglie equation. The red spectral line of an atom occurs at 671 nm. Calculate the energy of one photon of this light. — 1+3

   (c) Which of the orbitals namely 1p, 2s, 2p, 3f are not? Give reasons to your answer. — 3

7. (a) Using VSEPR theory , justify the decrease in bond angle in the following series: — 2
   $CH_4 > NH_3 > H_2O$

   (b) What is chemical kinetics? Discuss photochemical kinetics of H_2 and Cl_2 reaction in absence of oxygen. — 5

   (c) Write MO configurations for O_2 and O_2^{2-}? Calculate its bond order. Which of them is paramagnetic? — 3