

Department of Computer Science and Engineering  
University of Dhaka  
First Year Hons' 2013      Chemistry Incourse 2  
Full Marks: 30      Time 1.5 h

Answer All Question

1. (a) State and explain Hess's law. 2  
 (b) Derive the equation to find the effect of temperature on the heat of reaction. 3  
 (c) The heat of combustion of propane at 25 °C and constant pressure is 530.6 Kcal/mole; the heat of formation of water is 68.3 and for carbon dioxide is 94.2 Kcal/mole. Calculate the heat of formation of propane at 25 °C and (a) at constant pressure, (b) at constant volume. 3
2. (d) Define integral heat of solution. What do you mean by aqueous solution? 2  
 (a) State the Law of Mass Action. Find the expression for  $K_p$  of the reaction: 2  
 $3H_2 + N_2 \leftrightarrow 2NH_3$  3  
 (b) Derive the relationship between  $K_p$  and  $K_c$ . 3  
 (c) With the help of Le Chatelier principle explain the effect of temperature and pressure on the reaction: 3  
 $3H_2 + N_2 \leftrightarrow 2NH_3$  2  
 (d) For the reaction:  $2SO_3 \leftrightarrow 2SO_2 + O_2$  2  
 At equilibrium and 760 mm Hg total pressure the mole fraction data are:  $SO_2 = 0.309$ ;  $SO_3 = 0.338$ ;  $O_2 = 0.353$ . Calculate the values of  $K_p$  and  $K_c$ . 3  
 Temp = 25 °C 3
3. (a) Define phase, component and degree of freedom with examples. 3  
 (b) Find number of phases, components and degree of freedom for the reaction: 3  
 $NH_4Cl(s) \leftrightarrow NH_3(g) + HCl(g)$   
 (c) Draw the phase diagram of water. What is triple point? Find number of phases and degrees of freedom at this point. 4

Set C (1<sup>st</sup> year 2013, CT-2, CSE 1101, Time: 1 hour, Marks: 15)

1. Define Extranet. 1
2. Write down the features of Linux 2
3. Mention the main difference between assembly language and machine language. 1.5
4. How data can be read from an optical disk. 2.5
5. Distinguish between hard disc and flash memory. 2
6. Write a short on the applications of internet. 4
7. Mention the features of high level languages. 2

Department of Computer Science and Engineering  
Incourse Exam-1

Course Title: Physics  
Date: 06. 03. 2013

Course Code: Phy -1122  
Duration: 50 min.

Answer all the questions

1. Define electric flux density  $\Phi_E$ . Write down the four Maxwell's equations of classical electrodynamics. 1+  
4
2. Find the electric field  $\vec{E}$  outside a uniformly charged solid sphere of radius R and total charge q. 5  
5
3. Derive the charge continuity equation given by  $\frac{\partial \rho}{\partial t} = -\vec{\nabla} \cdot \vec{J}$ . 5
4. How did Maxwell propose the correction to the Ampere's law? 5

**Set D (1<sup>st</sup> year 2013, CT-1, CSE 1101, Time: 1hour, Marks: 15)**

- |   |     |
|---|-----|
| 1. Mention the features of 5 <sup>th</sup> generation computers.              | 1.5 |
| 2. Explain working principle of a speaker.                                    | 3   |
| 3. Mention the function of BIOS.  | 1   |
| 4. Mention the main difference between flatbed scanner and sheet-fed scanner. | 1   |
| 5. Explain working principle of a ink-jet printer.                            | 3.5 |
| 6. Distinguish between SRAM and DRAM.   | 3   |
| 7. What happens when a keyboard of a key is pressed?                          | 2   |

University of Dhaka  
Department of Computer Science  
First Year 1<sup>st</sup> Semester 2012-13 First Incourse Examination  
Course No. MATH-1124      Calculus      Marks: 30

Answer any 5 questions. All questions are of equal value. Time: 1 (One) hour.

1. (a) Define domain and range of a function  $f(x)$ . Given that  $f(x) = -\sqrt{3-2x}$  find  $f^{-1}(x)$  and sketch the graphs of  $f$  and  $f^{-1}$  hence, state the domain and range of  $f^{-1}$ .

(b) What do you mean by  $\lim_{x \rightarrow a} f(x)$  and  $f(a)$ ?

2. (a) Sketch the graphs of (i)  $y = 3 - |2x - 4|$  (ii)  $y = 3 + \sqrt{x+1}$  (iii)  $y = |x-3| + 2$  and hence write down the domain and range for each of them.

(b) Find formulas for  $f \circ g$  and  $g \circ f$  then state the domain and range of them where  $f(x) = \sqrt{x-3}$  and  $g(x) = \sqrt{x^2+3}$ .

3. (a) Evaluate the following limits:

(i)  $\lim_{x \rightarrow 2} \frac{x^3 + 3x^2 - 12x + 4}{x^3 - 4x}$

(ii)  $\lim_{x \rightarrow 0} \frac{\cos 2x - 1}{\cos x - 1}$

(b) If  $f(x) = \begin{cases} 1+x, & x > 0 \\ 1-x, & x \leq 0 \end{cases}$ , does  $f'(0)$  exist?

4. Test the continuity and differentiability of a function  $f(x)$  at a point  $x = 0$  and  $x = \pi/2$  where

$$f(x) = \begin{cases} 1, & x < 0 \\ 1 + \sin x, & 0 \leq x < \pi/2 \\ 2 + (x - \pi/2)^2, & x \geq \pi/2 \end{cases}$$

5. Find the derivatives of the functions

(i)  $y = \sin^3(\ln 2x^2)$

(ii)  $y = \frac{3at^2}{1+t^3}, x = \frac{3at}{1+t^3}$

(iii)  $y = x^{\tan^{-1} x} + (\sin x)^{\log x}$

(iv)  $y = \sin^{-1}(3x - 4x^3)$

6. (a) State Leibnitz theorem. If  $y = e^{a \sin^{-1} x}$ , then show that,

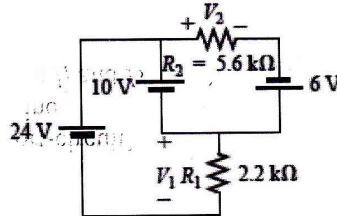
$$(1-x^2)y_{n+2} - (2n+1)xy_{n+1} - (n^2 + a^2)y_n = 0.$$

(b) A 5 ft ladder, leaning against a wall, slips in such a way that its base is moving away from the wall at a rate of 2 ft/sec at the instant when the base is 4 ft away from the wall. How fast is the top of the ladder moving down the wall at the instant?

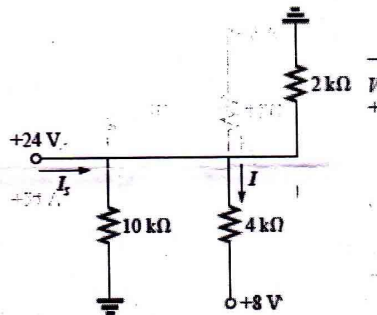
Total Marks: 35

Time: 1 Hour

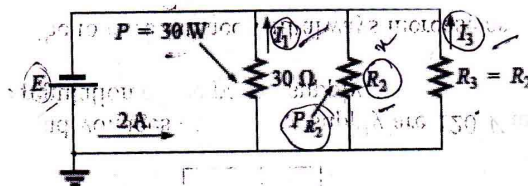
1. a) State Kirchhoff's voltage law with a suitable figure. 3
- b) Determine the unknown voltages using Kirchhoff's voltage law. 3



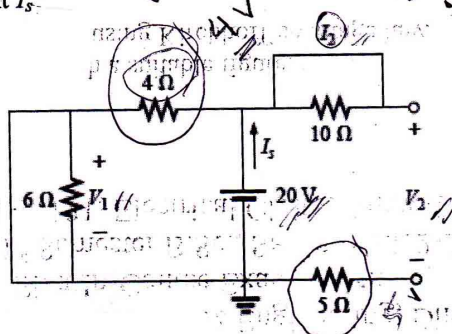
- c) The no-load and full-load voltages of a power supply are 120 V and 100 V respectively. Calculate the voltage regulation of the power supply. 2
2. a) "For parallel resistors, the total resistance will always increase as additional elements are added in parallel". Do you agree? Give proof in favor of your opinion. 4
- b) For the network below 5
  - i) Find the current  $I$
  - ii) Determine the voltage  $V$
  - iii) Calculate the source current  $I_s$



3. a) What are the rules for dividing current in a parallel circuit? Also find the generic equation. 4
- b) Find the unknown quantities for the circuit using the information provided. 5



4. a) Define 'Open-circuit' and 'Short-circuit'. 4
- b) For the network below, determine 5
  - i) The short-circuit currents  $I_1$  and  $I_2$
  - ii) The voltages  $V_1$  and  $V_2$
  - iii) The source current  $I_s$



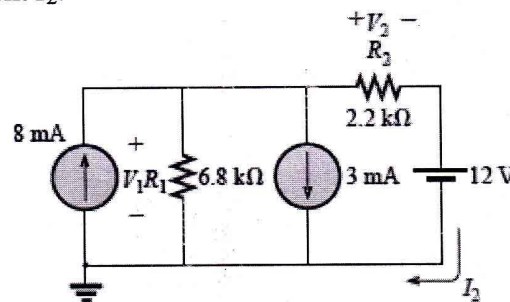


Department of Computer Science & Engineering, Dhaka University  
Second In-Course Examination  
1<sup>st</sup> Year 1<sup>st</sup> Semester B.Sc., Session: 2012-2013  
EEE – 1121, Electrical Circuit Analysis

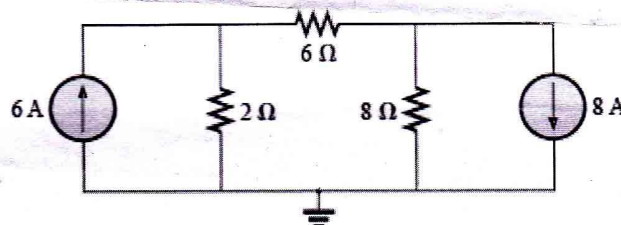
Total Marks: 35

Time: 1 Hour

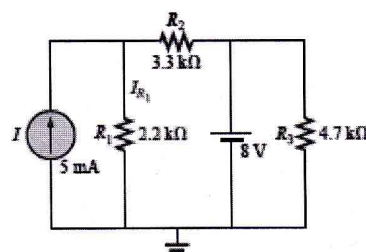
1. a) Draw a practical voltage source and current source and prove that **source conversions are equivalent only at their external terminals.** 1+3
- b) Is it possible to connect current sources of different current ratings in series? Why? 2
- c) For the network for the following figure: 4
  - i) Convert the voltage source to a current source.
  - ii) Reduce the network to a single current source, and determine the voltage  $V_1$ .
  - iii) Using the results of part (b), determine  $V_2$ .
  - iv) Calculate the current  $I_2$ .



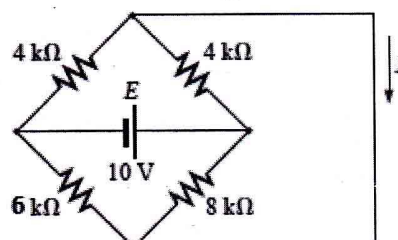
2. a) Briefly describe the concept of supermesh current. 2
- b) i) Using mesh analysis, determine the currents for the following network. 4+4
- ii) Using nodal analysis, determine the nodal voltages as well as currents for the same network. [Hint. Use format approach]



3. a) What are relative advantages of Thevenin's theorem? 2
- b) i) Using superposition, find the current through  $R_1$  for the following network. 4+4
- ii) Find the Thevenin's equivalent circuit for the same external to the  $R_1$  and prove that the same current is passing through  $R_1$ .



4. a) What is the limitation of reciprocity theorem? 1
- b) Prove the reciprocity theorem for the following network for the voltage  $E$  and current  $I$ . 4



Answer any 5 questions. All questions are of equal value. Time: 1 (One) hour.

✓ 1. (a) Differentiate  $\tan^{-1} \frac{2x}{1-x^2}$  with respect to  $\sin^{-1} \frac{2x}{1+x^2}$ .

(b) State Mean Value theorem. Verify Mean Value theorem for  $f(x) = 3 + 2x - x^2$  in the interval  $[0, 1]$ .

✓ 2. (a) Let  $f(x) = x^3 - 3x^2 + 1$ . Find the intervals where  $f(x)$  is increasing, decreasing, concave up and concave down.

(b) Find the maximum and minimum values of  $1 + 2 \sin x + 3 \cos^2 x$ ,  $0 \leq x \leq \pi/2$ .

3. (a) Find the intervals where the function  $f(x) = xe^{-x}$  is concave up and concave down.

(b) For the function  $f(x) = x^3 - 3x - 1$  find the absolute maximum and absolute minimum values of  $f(x)$  in the interval  $[0, 2]$ .

✶ 4. Evaluate the following integrals:

(i)  $\int \frac{y}{\sqrt{y+1}} dy$  (ii)  $\int \frac{7-6\sin^2 \theta}{\sin^2 \theta} d\theta$  (iii)  $\int x \cos^2 x dx$  (iv)  $\int \frac{e^x}{e^{2x} + 2e^x + 5} dx$  (v)  $\int \frac{x}{2-6x-x^2} dx$

✓ 5. Compute the value of the following integrals:

(i)  $\int_1^2 (3x^2 - 2)^4 x dx$  (ii)  $\int_0^1 \tan^{-1} x dx$  (iii)  $\int_0^{\log 2} \frac{e^x}{e^x + 1} dx$  (iv)  $\int_0^{\pi/2} \cos 2x \cos 3x dx$

6. (a) Find the reduction formula for  $I_n = \int_0^{\pi/2} \sin^n x dx$ . Hence, evaluate  $\int \sin^6 x dx$ .

(b) Evaluate:  $\lim_{n \rightarrow \infty} \left[ \frac{n}{n^2 + 1^2} + \frac{n}{n^2 + 2^2} + \dots + \frac{1}{2n} \right]$ .

**Department of Computer Science and Engineering**  
**University of Dhaka**

**First Year First Semester In-course Examination – II**  
**Course: Programming Fundamentals**

Full Marks: 30

Duration: 1 Hour

Answer all questions.

1. a) What is a recursive function? What are its properties? 2+2  
b) Can we write a recursive function to print the binary equivalent of a given integer? 6  
If you think it is possible then write the recursive function. Justify your answer, otherwise.
2. a) What are the distinguishable and similar features between arrays and structures? 3  
b) When will you choose an array or a structure as your data type? 2
3. Suppose, you have a time data type as follows:

```
struct __time
{
    unsigned char hour;        /*0 to 23*/
    unsigned char minute;     /*0 to 59*/
    unsigned char second;     /*0 to 59*/
}
```

and, suppose, you have a function to check whether a given time is a valid (returns 1) or not (returns 0). The valid ranges of the time structure is given as comments with the corresponding fields. The prototype for the function is:

```
int checkValidTime(struct __time *tm);
```

- a) Write the for loops with the `__time` structure that will show all combination of the time of a day. 4
- b) Write the `checkValidTime` function for the given structure. 5
- c) Write a function for the given structure that shows (in the screen) the time of a datetime structure in AM/PM format. 6