

**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:

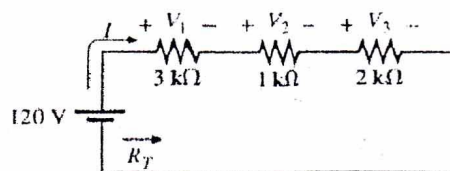
```
struct __time
{
    unsigned char hour;      /*0 to 23*/
    unsigned char minute;    /*0 to 59*/
    unsigned char second;    /*0 to 59*/
}
```

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:

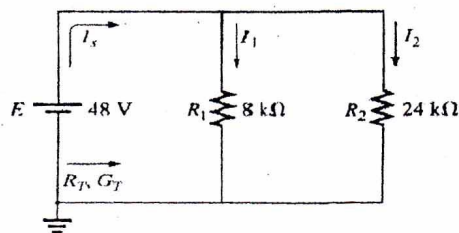
```
int checkValidTime(struct __time *tm);
```

- 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

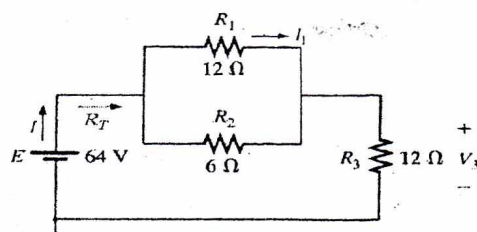
Department of Computer Science and Engineering
Incourse Examination
1st year 1st semester, 2012



1. For the above circuit:
 - a) Find the total resistance, current, and unknown voltage drops.
 - b) Verify Kirchhoff's voltage law around the closed loop.
 - c) Find the power dissipated by each resistor, and note whether the power delivered is equal to the power dissipated.
 - d) If the resistors are available with wattage ratings of 1/2, 1, and 2 W, what minimum wattage rating can be used for each resistor in this circuit?

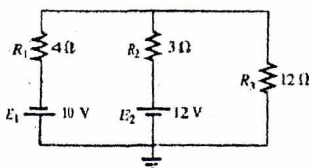


2. For the above network
 - a) Find the total conductance and resistance.
 - b) Determine I_s and the current through each parallel branch.
 - c) Verify that the source current equals the sum of the parallel branch currents.
 - d) Find the power dissipated by each resistor, and note whether the power delivered is equal to the power dissipated.
 - e) If the resistors are available with wattage ratings of 1/2, 1, 2, and 50 W, what is the minimum wattage rating for each resistor?

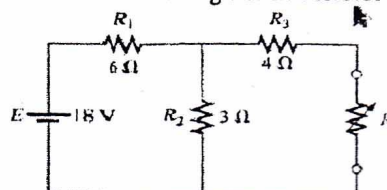


Department of Computer Science and Engineering, 1st year 1st semester, 2012

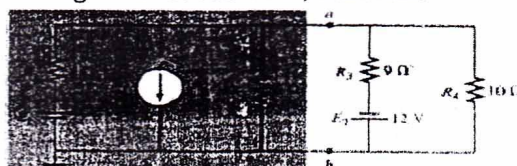
3. For the above network:
 - a) Calculate R_T .
 - b) Determine I and I_1 .
 - c) Find V_3 .



1. For the above circuit, find the current through each resistor (using mesh analysis).



2. For the above network
 - a) Find the Thévenin equivalent circuit for the network external to the resistor R .
 - b) Find the current through R when R is 30 Ω, and 100 Ω.



3. For the above network: Find the Norton equivalent circuit.

Answer All Questions

1. a) State Law of Mass Action. 1.0
 b) Establish the relation between K_p and K_c 3.0
 c) Explain the effect of temperature and pressure on the reaction: 3

$$N_2(g) + 3H_2(g) \rightarrow 2NH_3(g) + 21.41 \text{ k.cal.}$$

 d) One mole of ethyl alcohol is mixed with one mole of acetic acid. At 3
 equilibrium and at 25°C it is found that 0.667 mole of ethyl acetate has been
 formed. Calculate the equilibrium constant for the reaction:

$$C_2H_5OH + CH_3COOH \rightarrow CH_3COOC_2H_5 + H_2O$$

2. a) Define phase, component, and degrees of freedom. 3.0
 b) Find number of phases, components and degrees of freedom of: 3.0
 (i) Mixture of sand, sugar, salt and water, (ii) water at triple point.
 c) What is triple point? Explain it with the help of a phase diagram. 3.0
 d) How super cooled water can be obtained? 1.0

3. a) Find the expression for the velocity constant of a bimolecular reaction. 3.0
 b) How would you distinguish between a unimolecular and bimolecular reaction? 2.0
 c) Half life of a bimolecular reaction depends on the initial concentration while 3.0
 that of a unimolecular reaction does not, explain.

- d) The optical rotation of sucrose in 0.9 (M) HCl at various times is given below:

Time: (min)	0	10	20	30	40	80
Rotation (degrees)	+32.4	+28.8	+25.5	+22.4	+19.6	-14.1

Calculate the order of the reaction.

2.0

Department of Computer Science and Engineering
University of Dhaka
Chemistry Incourse 1, 2011-2012
Full Marks: 30 Time 1h

wer All Question

1. (a) Write the postulates of Bohr's atomic model 3
- (b) Explain the multiplicity of the spectral line of a hydrogen atom. 2
- (c) State (i) Pauli's exclusion principle, (ii) Heisenberg's uncertainty principle 2
- (d) Show the electronic configuration of Cr and explain why it has $3d^5 4s^1$ instead of $3d^4 4s^2$ configuration 2
- (e) Find the values of all quantum numbers for the 19th electron in chromium. 3
- (f) An electron is in 4f orbital. What possible values for the quantum numbers n, l, m and s it can have? 3
2. (a) Find types of bonding with explanation in (i) methane, (ii) magnesium chloride, (iii) diammine silver chloride. 3
- (b) Sodium iodide is soluble in water while silver iodide is not, explain. 2
- (c) Why does ice float in water? 2
- (d) Draw all five d-orbitals. 3
- (e) Classify H-bonding and show the type of H-bonding in O-hydroxybenzoic acid. 3
- (f) Explain why does the electrical conductivity of a metal reduce with increasing temperature? 2

Dept. of Computer Science and Engineering
Incourse Examination-1

Date: 10.03.2012

Time: 50 minutes

1.	State the postulates of special theory of relativity.	2.5+2.5
2.	Prove that the concept of simultaneity is not absolute.	5
3.	Show that a clock runs fastest in a reference frame at which it is at rest.	5
4.	Show that for massless particles, energy E and momentum p is related by $E=pc$.	5

First Year B.Sc (Hons.) Incourse (Second) Examination 2012
Course No. MATH 1124 : Calculus
Department of Computer Science and Engineering
Full Marks : 30 Time : 1 (One) hour

N.B. : Answer the following questions.

1.	(a) What do you mean by the limit of a function f using (δ, ϵ) -method? (b) Prove that $\lim_{x \rightarrow 0} \frac{2x^2 + x}{x} = 1$ by using (δ, ϵ) -method.	2+4
2.	(a) Define the continuity of a function f at a point $x = x_0$. (b) Discuss the continuity of a function f at $x = 1$ where f is defined by $f(x) = \begin{cases} 2x-3 & \text{if } x \leq 2 \\ x^2 & \text{if } x > 2 \end{cases}$	2+4
3.	Compute $\frac{dy}{dx}$: (a) $y = \frac{1}{\sqrt{x}} + \frac{1}{\sqrt{y}}$; (b) $y = x^{\cos x}$.	4+4
4.	(a) Locate the critical points and identify which critical points are stationary points of $f(x) = 4x^4 - 16x^2 + 17$. (b) Find the relative extrema of f . (c) Find the intervals for which f is increasing or decreasing. (d) Find the intervals for which f is concave up or concave down. (e) Locate the point of inflection of f .	10

First Year B.Sc (Hons.) Incourse (First) Examination 2012
Course No. MATH 1124 : Calculus
Department of Computer Science and Engineering
Full Marks : 40 Time : 1 (One) hour

N.B. : Answer the following questions.

1.	Define a function f from a non-empty set X to another non-empty set Y with an example. Is $x^2 + y^2 = a^2$, where a is a constant, a function of x ? Justify your answer.	8
2.	Define the domain and range of a function. Sketch the following functions defined by (i) $f(x) = x^2 - 16$; (ii) $g(x) = x + x+2 $; (iii) $h(x) = 2 \sin x + 1$. Hence, compute the domain and range of each.	16
3.	Compute multiplication $(f \cdot g)(x)$, division $(f/g)(x)$, composition function $(f \circ g)(x)$, where $f(x) = \sqrt{x-3}$ and $g(x) = x+3$.	10
4.	Find the inverse of $f(x) = \cos \ln x$, $0 < x < \infty$. Sketch the graph of f and f^{-1} in a same figure.	6

Dept. of Computer Science and Engineering
Second Incourse Examination

Course Title- Physics
Time-50 minutes

Course Code-1122
Date: 08.04. 2012

Answer the following questions

- Find the expression for the electric field a distance z above the midpoint of straight line segment of length $2L$ which carries a uniform line charge α . 5
- Define electric flux density. Show that $\vec{\nabla}_o \vec{E} = \frac{\rho}{\epsilon_o}$. 5
- How did Maxwell propose the correction to the Ampere's law of magnetism? 5
- Derive the continuity equation for classical electromagnetism. 5

1st year 2012 CT-1 CSE 1101 Time: 45 minutes Marks: 15
Set B

- | | |
|---|-----|
| 1. Describe working principle of an ink-jet printer. | 3.5 |
| 2. Distinguish between EPROM and EEPROM. | 1.5 |
| 3. Define interpreter. | 1 |
| 4. How digital data is converted into sound? Explain. | 2.5 |
| 5. Mention features of Linux. | 1 |
| ✓6. Why do we use BIOS in a computer? | 1 |
| ✓7. Mention features of a computer. | 1.5 |
| ✓8. Define virtual memory. | 1 |
| ✓9. How can we define hardware? | 1 |
| 10. What is the main function of an OS? | 1 |

Set B (1st year 2012, CT-3, CSE 1101, Time: 50 minutes, Marks: 15)

- | | |
|---|-----|
| ✓1. Define mouse. | 1 |
| ✓2. Describe the structure of a track-ball mouse. | 3 |
| ✓3. Write down the benefits of optical mice over track-ball mice. | 2 |
| ✓4. Write a short note about digital camera. | 2 |
| 5. Write down the features of Pentium III. | 1.5 |
| ✓6. Describe the components of CPU. | 2.5 |
| ✓7. Define op-code of an instruction of a microprocessor. | 1 |
| ✓8. Write down the features of Celeron. | 2 |

Set A (1st year 2012, CT-3, CSE 1101, Time: 50 minutes, Marks: 15)

- | | |
|--|-----|
| 1. Mention the groups of keys of a keyboard. | 1.5 |
| 2. Write down the names of keyboard layouts. | 1.5 |
| 3. What happens when a key is pressed in a keyboard? | 2.5 |
| ✓4. Describe arrangement of keys in a keyboard. | 2 |
| 5. Write down the features of Pentium IV. | 1.5 |
| 6. Mention the main functions of a CPU | 2 |
| 7. Define instruction set of a microprocessor. | 1 |
| 8. Distinguish between RISC and CISC. | 3 |

Set B (1st year 2012, CT-2, CSE 1101, Time: 50 minutes, Marks: 15)

- | | |
|---|-----|
| ✓1. Distinguish between router and gateway. | 1.5 |
| ✓2. Write a short note about coaxial cable. | 2.5 |
| ✓3. Describe structure and data flow technique of a Star topology | 3 |
| 4. What is the main function of <u>session layer of OSI reference model</u> ? | 1 |
| ✓5. Define network backbone. Modem segment of a network. | 1 |
| ✓6. How viruses are spreading from computer to computer? | 2 |
| ✓7. Distinguish between wired and wireless transmission. | 3 |