

14/10/15

AHSANULLAH UNIVERSITY OF SCIENCE AND TECHNOLOGY
DEPARTMENT OF ARTS AND SCIENCES

Semester Final Examination

Spring Semester 2015

Program: B. Sc. in Computer Science & Engineering

1st Year, 1st Semester

Course Code: HUM 1107

Course Title: Critical Thinking and Communication

Full Marks: 70

Time: 3 hours

There are 10 (ten) questions in this question paper. Answer any 7 (seven) of them.

(Marks allocated are indicated in the right margin.)

Question#1. 'Rational decision-making is a multi-step process for making logically sound decisions'. 10
Discuss the process of making rational decisions elaborately.

Question#2. "Critical thinking is self-guided, self-disciplined thinking which attempts to reason at the highest level of quality in a fair-minded way". Discuss with reference to your study of critical thinking. 10

Question#3. Define and explain with examples: (a) argument (b) fallacy 10

Question#4. Differentiate between inductive argument and deductive argument with examples. 10

Question#5. Identify whether the following groups of statements make arguments or fallacies and explain why: 10

a. 36,000 students appeared at a public examination. 18,000 of them came out successful. So, the rate of success in the examination is clearly $\frac{1}{2}\%$.

b. The garment workers have signed a petition stating that they feel suffocated as they have poor ventilation in the factory building, and as such they need better ventilation on the work premises. The owner of the garment industry says that air-conditioning is very expensive. Air ducts would have to be run throughout the factory, and a massive heat exchange unit installed on the roof. In addition, the cost of operating such a system during the summer would be huge. In view of these considerations, the petition must be rejected.

c. We would like to decrease the amount of litter on the streets of Dhaka City. In Singapore City, those citizens convicted of littering must serve jail time. If Dhaka City passed such a policy, the streets of Dhaka would be as clean as those of Singapore.

d. Two independent witnesses claimed that John committed the murder. Moreover, John's fingerprints are the only ones on the murder weapon. In addition, John confessed to the crime. Therefore, John committed the murder.

Question#6. Answer the following questions:

(A). Fill in the blanks with appropriate forms of the verbs given in brackets: 2.5

Tom Wilson is an explorer. He (i)(be) to nearly every country in the world, but the most exciting time he (ii)(ever/have) was when he (iii)(go) to the Congo jungle. A magazine (iv)(ask) him to retrace the route of a famous explorer who (v)(disappear) in the 1920's. As he (vi)(follow) a small river, he got separated from his guides. He (vii)(go on) alone, hoping he (viii) ... (find) them, but instead he (ix)(encounter) a group of natives. He (x)(stay) with them for several days.

(B). Turn the following direct questions into polite questions: 2.5

- (i) What is your name?
- (ii) When did she come home?
- (iii) Is our university near the Independent TV station?
- (iv) Where do the students go in the evening?
- (v) What medical college did you suggest?

(C). Copy the following excerpt in your answer script making necessary corrections: 2.5

The world has made tremendous progress in eradicate polio. Globally, the incidence of polio cases have been declined by 90 percent. However, certain parts of South Asia and Africa are still threatened by this disease. The health authorities have still got plenty to do towards wipe out polio. Polio is a high infect disease. Thus, when there is a threat of epidemic many social activities are called off. Schools are also close. People are scarce and they avoid contact with those infected with the disease.

(D). Fill in the blanks with appropriate word(s) to make them meaningful conditional sentences: 2.5

- (i) If you freeze water, it _____ solid.
- (ii) If you _____ in Dhaka, why didn't you come and see us?
- (iii) What could we do if he _____ his job?
- (iv) If the weather is fine tomorrow, we _____ the zoo?
- (v) If I hadn't been so tired, I _____.

Question#7. Compose a paragraph on any one of the following topics in about 150 words (Use appropriate connecting devices maintaining other rules of writing): 10

- a. Benefits of Studying Computer Science and Engineering
- b. How to Study for Doing Well in a Semester Final Examination

Question#8. International IT Limited invited applications for the position of Analyst Programmer through a vacancy announcement in *the Prothom Alo* on 15 August 2015. The candidates should have bachelor's degrees as minimum academic qualification. Candidates having good communication skills in English and Bengali, strong analytical ability and positive attitude will be given preference. Interested candidates have been advised to apply to Managing Director, International IT Limited, Banani, Dhaka by 25 October 2015. Draft a cover letter and a resume according to the requirements of the job advertised.

Question#9. Suppose some food vendors sell unhygienic ready-to-eat food items to the students in front of your university. You have been assigned to investigate into the matter and write a report to the Registrar of your university. Draft the report. 10

Pay It Forward is a book, written by Catherine Ryan Hyde, which was later made into a movie of the same name. In the movie, a young boy, Trevor, was challenged by his teacher to come up with an idea that could change the world and to put this idea into action. Trevor decided to do a kind deed for three different people. These people then did the same to others. Each of these three people then did the same good deed for three other people. As a result, Trevor's one good deed led to nine acts of kindness and so the cycle continued.

Trevor may just be an imaginary character, but this work of fiction has been put into practice by the Random Acts of Kindness Foundation, an organisation set up to encourage people to carry out good deeds. People all over the world are experiencing the pleasure of having kind deeds done for them and they in turn reciprocate.

There are countless ways for people to show acts of kindness. It is not limited to giving money by donating to a needy cause, but we can also take time out to listen to someone who has a problem and needs a friend. "Somebody paid for my order at a restaurant once," says Syed Haizir. "It really made my day, so I try to do something similar as often as I can," he adds. Au Yeong, a student, also found inspiration from the movie, *Pay It Forward*. On some days, he buys copies of newspapers and puts a note between the pages saying, "Enjoy reading ... from someone who just wants to be kind." Then he gives the newspapers free to people waiting at the bus-stop or at the train station.

A little creativity is very helpful in making others happy. If you come across a humorous comic strip or an inspiring article, cut it out. Pass it on to someone who might be interested in reading it. This will put a smile on their face. Put together writing kits with stationery, envelopes, stamps or art supplies and hand them over to patients at a hospital. These items will come in handy to help patients keep in touch with friends as well as to keep 'them' occupied. You can give students inexpensive raincoats which they can keep in their bags. On rainy days, these will really be appreciated: textbooks and uniforms can be kept dry, and colds may be prevented. A small act of kindness goes a long way.

There are indeed many ways to show kindness. You may think that being kind will cost you a lot of money. Even those with the kindest hearts can be overwhelmed by the idea of doing charity because they think it will take up too much of their time. However, you can do good deeds for others with just what you have, and the wonderful thing is that there are a lot of benefits for the people who do these deeds. When people help others, they feel great about what they do. They experience a greater sense of well-being which is critically important as it helps to reduce common problems like stress and depression. These people will be able to cope better with their own worries and problems.

Kindness has a way of catching on. Acts of kindness will give rise to more acts of kindness. When more people show kindness to each other, society will undergo changes. As each good turn leads to the next, the effect will multiply, thus producing a caring society where people will be more concerned for others. Consequently, this will lead to more positive effects like a lower crime rate and happier citizens. We may start by wanting to do something good, without expecting to get anything in return at all. However, what a thrill it is to be on the receiving end. Somehow, someday, our acts of kindness will certainly come back to us.

Questions:

- What is the name of the movie?
- How did Trevor try to change the world?
- What is the aim of the *Random Acts of Kindness Foundation*?
- Which word from the second paragraph means 'do the same to others'?
- What effect can a comic strip have on a person reading it?
- Who does the word 'them' in paragraph 4 refer to?
- Give two reasons why some people are not prepared to do acts of kindness.
- Without using examples from the passage, suggest two ways in which you can be kind to others.
- State some benefits that can be experienced from acts of kindness.
- Give a suitable title to the passage.

Ahsanullah University of Science and Technology

Final Examination of Spring Semester 2015

Department of Arts and Sciences

Program: B. Sc. in Computer Science and Engineering

1st Semester of 1st Year

Course No: MATH-1115

Time: 03 (three) hours

Course Title: Mathematics-I

Full Marks: 70

There are 7 (Seven) questions in group A and B. Answer 5 (Five) questions, taking 3 (Three) from Group-A and 2 (Two) from Group-B.

Marks allotted are indicated in the right margin

Group-A

1. a) Define limit of a function $f(x)$ at $x = a$.

[8]

A function $f(x)$ is defined as $f(x) = \begin{cases} 1+x & \text{for } x \leq 0 \\ x & \text{for } 0 < x < 1 \\ 2-x & \text{for } 1 \leq x \leq 2 \\ 2x-x^2 & \text{for } x > 2 \end{cases}$

Test the continuity of $f(x)$ at $x = 1$ and differentiability of $f(x)$ at $x = 2$.

b) State Euler's theorem for homogeneous functions of two variables. If [6]

$$u = \cos^{-1} \left\{ \frac{x+y}{\sqrt{x+y}} \right\}, \text{ show that } x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} + \frac{1}{2} \cot u = 0.$$

2. a) State Leibnitz's theorem. If $y = \sin(m \sin^{-1} x)$, then show that [7]

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

b) State Roll's Theorem and Mean Value Theorem (MVT). Find the value of θ using [7] second MVT for the function $f(x) = \frac{1}{3}x^3 - \frac{3}{2}x^2 + 2x$ if $a = 0, h = 3$.

3. a) Expand $\sin x$ into an infinite series of ascending powers of x .

[5]

b) Given $\frac{x}{2} + \frac{y}{3} = 1$, find the maximum value of xy and minimum value of $x^2 + y^2$.

[5]

c) Evaluate the indeterminate form: $\lim_{x \rightarrow 0} \frac{e^x - e^{-x} - 2x}{x - \sin x}$.

[4]

4. a) Prove that the curves $\frac{x^2}{a} + \frac{y^2}{b} = 1$ and $\frac{x^2}{a_1} + \frac{y^2}{b_1} = 1$ will cut orthogonally if [5]
 $a - b = a_1 - b_1$.
- b) Define sub-tangent and sub-normal at a point of a curve. [2]
- b) Define radius of curvature. Find the curvature of the Folium $x^3 + y^3 = 3axy$ at [7]
 $\left(\frac{3a}{2}, \frac{3a}{2}\right)$.

Group-B

5. a) Find the equation of curve $x^2 - 2y^2 + 3xy = 5$, if the origin is transferred to the point [5]
 $(4, -3)$.
- b) Determine the angle through which the axes must be rotated to remove the xy term of [2]
the equation $7x^2 - 6\sqrt{3}xy + 13y^2 = 16$.
- c) Prove that the pair of straight lines joining the origin to the point of intersection of the [7]
curve $y^2 = 4ax$ by the line $y = mx + c$ are coincident if $c = a/m$.
6. a) Find the equation of the bisectors of the angles between the pair of straight lines given [7]
by $2x^2 + 7xy + 6y^2 + 13x + 22y + 20 = 0$.
- b) Find the director circle of the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$. [7]
7. a) Define radical axis. Find the equation of the circle whose diameter is the common [7]
chord of the circles $x^2 + y^2 + 2x + 3y + 1 = 0$ and $x^2 + y^2 + 4x + 3y + 2 = 0$.
- b) Find the general equation of the system of coaxial circles containing the circle [7]
 $x^2 + y^2 = 9$ and the limiting point $(2, 3)$. Find also the other limiting point.

Date: 11/10/15

Ahsanullah University of Science and Technology

Final Examination of Spring Semester, 2015

Department of Arts and Sciences

Program: B. Sc. in Computer Science and Engineering

1st semester of 1st year

Course No: Phy-1115

Course Title: Physics

Time: 3 Hours

Full marks: 70

There are 7 (Seven) questions. Answer any 5 (five) taking at least 1 (one) from each group.

(Marks allotted are indicated in the right margin)

[Use answer script A for groups A&B and B for group C]

Group-A

1/ a) Define simple harmonic motion. Two simple harmonic motions of same frequency [7] and amplitude but in perpendicular directions are compounded. Find the resultant motions if the phase differences are $\pi/4$ and $3\pi/4$ between the individual vibrations.

b) What are Lissajous' figures? Describe an experimental method for obtaining [5] Lissajous' figure.

c) A body executing simple harmonic motion has a maximum acceleration of $8\pi \text{ m/s}^2$ [2] and a maximum speed of 1.6 m/s. Find the period and the amplitude of the motion.

2/ a) Describe the forces that are simultaneously acting on a body executing simple [3] harmonic oscillations in a damping medium.

b) What is damped harmonic oscillation? Discuss in detail the conditions under which [7] the oscillations become dead beat, critically damped and oscillatory.

c) Establish the differential equation of forced harmonic oscillation. [4]

3/ a) What do you mean by particle velocity and wave velocity? Establish a relation [4] between particle velocity and wave velocity.

b) Discuss analytically the formation of stationary wave and explain how the [7] characteristics change with respect to time.

c) The apparent frequency of the whistle of an engine changes in the ratio 6:5 as the [3] engine passes a stationary observer. If the velocity of sound is 352 m/s, calculate the velocity of the engine.

Group-B

$$\lambda' = \frac{\sqrt{400}}{\sqrt{-4}} \quad \frac{6}{5} = \frac{\sqrt{400}}{\sqrt{-4}}$$
$$\lambda' = \frac{\sqrt{400}}{\sqrt{4}}$$

4/ a) State and explain [4]

- Ampere's law.
- Biot-Savart law.

b) For a circular coil of radius R and carrying a current i , calculate the magnetic field [6] along the axis at a distance "x" from its centre. What is the magnitude of B at its centre?

c) Two similar coils of wire having a radius of 7 cm. and 60 turns have a common [4]

axis and are 18 cm apart. Find the strength of the magnetic field at a point midway between them on their common axis, when a current of 0.1 amp. is passed through them.

5. a) What do you mean by self inductance? Calculate the self inductance of a solenoid.
b) A circuit containing resistance (R) and inductance (L) in series with a DC source. Show that the rate of growth of current of the circuit is $\frac{di}{dt} = \frac{R}{L} (I_0 - I)$, where the symbols have their usual meaning. Also calculate the time constant of that circuit.
c) Give the energy band description of semiconductors.

[5]
[6]

[3]

Group-C

6. a) What is meant by the interference of light? Write down the fundamental conditions for interference of light.
b) Show that all interference fringes of light in Young's double slit experiment are equal in width and are independent of the order of the fringe.
c) A light source emits light of two wavelengths of $\lambda_1 = 5890 \text{ \AA}$ and $\lambda_2 = 5896 \text{ \AA}$. The source is used in a double slit interference experiment. The distance between the sources and the screen is 1.5 m and the distance between the slits is 0.025 mm. Calculate the separation between the 2nd order bright fringes due to these two wavelengths. 7.2×10^{-6}
7. a) Distinguish between resolving power and dispersive power of a diffraction grating.
b) State and explain Brewster's law of polarization.
c) How will you orient the polarizer and analyzer so that a beam of light is reduced to i) 0.25, ii) 0.5 & iii) 0.75 of its original intensity?

[4]

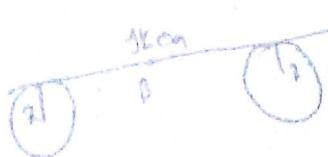
[6]

[4]

[5]

[5]

[4]



$$B = \frac{\mu_0 IN^2}{4\pi R^2} \left(\frac{1}{R_1^2} + \frac{1}{R_2^2} \right)^{-\frac{1}{2}}$$

$$= \frac{4\pi \times 10^{-7} \times 0.1 \times 60 \times \left(\frac{0.025}{0.18}\right)^2}{2 \left(\frac{1}{0.025^2} + \frac{1}{0.18^2} \right)^{\frac{1}{2}}}$$

AIRSANULLAH UNIVERSITY OF SCIENCE AND TECHNOLOGY

Department of Arts and Sciences

Program: B. Sc. in Computer Science and Engineering
1st Year, 1st Semester, Final Examination (Spring 2015)

Course code: Chem 1115

Time: 3 hours

Course title: Chemistry
Full Marks: 70*Out of seven (7) questions, answer any five (5)
Marks allotted are indicated in the margin*

1. (a) What do you mean by atomic spectrum? Describe the hydrogen emission spectrum. [1+3]
- (b) What is the name of the subshell in which the principal quantum number, $n = 4$ and subsidiary quantum number, $l = 2$. Sketches the shapes of the orbitals in this subshell. [1+3]
- (c) State all the principles/rules (three) that govern the distribution of electrons in an atom with example. [3]
- (d) The red spectral line of lithium occurs at 671 nm. Calculate the energy of one photon of this light where h is the Planck's constant (6.63×10^{-34} J.s) and c (3.0×10^{10} cm/s) is the speed of light. [3]
2. (a) Describe the formation of the following cells with their applications- dry cell, fuel cell and lead storage cell. [6]
- (b) What mass of copper will be deposited by a current of 7.89 amperes flowing for a period of 1200 seconds? [3]
- (c) What is a phase diagram? Show the phase diagram of water system. [3]
- (d) Define and differentiate the following reaction.
Disproportionation and redox reaction [2]
3. (a) Draw the molecular orbital diagram of O₂ molecule and discuss its magnetic property, bond length and bond order. [2+2]
- (b) What is the hybridization of atomic orbital? Discuss the bonding pattern of ethyne (C₂H₂) molecule according to hybridization theory. [1+2]
- (c) Draw and name the molecular geometry of the following molecules- BeCl₂, NH₄⁺, PCl₅, SF₆. [4]
- (d) Cite the conditions to form a hydrogen bond (H-bond). Which one of the following molecules can form H-bond. CH₄, NH₃, NaOH and HI [1+2]

1. (a) What do you understand by the rate of a reaction? How does the rate constant for a reaction vary with temperature? [3]
- (b) Describe the collision theory of a chemical reaction. [3]
- (c) Show that the half-life of a first order reaction is independent on the initial concentration of reactant. Discuss the half-life method to determine the order of a reaction. [2+2]
- (d) Calculate the half-life of a reaction whose rate constant is $1.052 \times 10^{-3} \text{ sec}^{-1}$. How long will it take to be completed to 75%. [3]
2. (a) What is meant by the diagonal relationship? Name two pairs of elements and their properties that show this relationship. [1+3]
- (b) What do you mean atomic radii? For each of the following pairs, indicate which one of the two species is larger (i) Na, F (ii) Fe^{2+} , Fe^{3+} (iii) Ca^{2+} , Mg^{2+} and (iv) Na^+ , F^- [1+2] 9
11
- (c) Discuss the position of hydrogen in the periodic table. [3]
- (d) Write down some sources of inert gases. What are the uses of neon and Radon gases? [2+2] 26 2A
3. (a) Derive the Henderson-Hasselbalch equation. What are the applications of this equation? [2+1]
- (b) Derive the expression for K_p and K_c for the following reaction: $\text{PCl}_5(\text{g}) \rightleftharpoons \text{PCl}_3(\text{g}) + \text{Cl}_2(\text{g})$ where α is the degree of dissociation. [4]
- (c) What are Lewis acids and bases? Select the conjugate acid-base pair of the followings: CH_3COOH , $\text{CH}_3\text{COOH}_2^+$, H_2CO_3 , HCO_3^- , H_2SO_4 and HSO_4^- [1+3]
- (d) A solution is prepared to be 0.10 M acetic acid and 0.20 M sodium acetate. What is the pH of the solution? K_a of ethanoic acid is $1.77 \times 10^{-5} \text{ M}^{-1}$ [3] 11
4. (a) What are colligative properties of a dilute solution? State the Raoult's law for the lowering of vapor pressure. [2+2]
- (b) What is osmotic pressure? How is the osmotic pressure of a solution affected by the concentration of solution and temperature? [3]
- (c) What would be the vapor pressure of water at 70°C if 1.00×10^2 g of water has dissolved 2.00×10^2 g of sucrose ($\text{C}_{12}\text{H}_{22}\text{O}_{11}$)? The vapor pressure of water is 31.2 kPa at 70°C . [3]
- (d) Derive the relationship $\text{pH} + \text{pOH} = 14$. Is it possible to get pH value zero for a solution, explain it. [4]

Ahsanullah University of Science and Technology

Department of Computer Science and Engineering

1st Year, 1st Semester, Final Examination (Spring 2015)

Course No: CSE 1101

Course Title: Elementary Structured Programming

Full Marks: 70

Time: 3 Hours

[Directions: There are 7(seven) questions. Answer any 5(five). Marks are shown at the end of each part of question.]

1. a) How do you define a Programming Language? Write down the differences between a compiler and an interpreter. 4

b) Draw a flowchart that takes one number as input from user and determines whether it is a Prime or not. 5

c) Write a program to input monthly salary from the user and calculate the income tax according to the following rules: 5

Salary	Income tax
≥ 9000	40% of the salary
7500-8999	30% of the salary
< 7500	20% of the salary

2. a) Describe the difference between while and do while loop with examples. 4

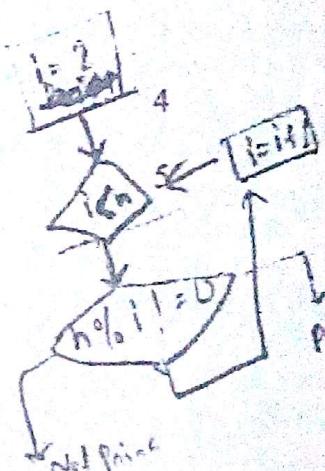
b) Write a program to display the following series up to n terms.

$$(2) + (2+4) + (2+4+6) + (2+4+6+8) + \dots \text{ up to } n \text{ terms}$$

Sample Input/Output

Enter n=2 :

$$(2) + (2+4).$$



c) Write a program to input 10 values in an integer array and to count the negative, positive, odd and even values in the array. 5

3. a) Describe static variables and register variables with examples. 4

b) Write a program to determine all Pythagorean triplets in the range 1 to 1000. 5
(A Pythagorean triplet is a set of three integers i, j, k such that $i^2 + j^2 = k^2$)

for (i=1 ; i<=1000 ; i++)

{ for (j=1 ; j<=1000 ; j++)

Page 1 of 4

{ for (k=1 ; k<=1000 ; k++)

{ if ((i*i+j*j)==k*k)

b) Find the output of the following program segment:

```

void func(char str[], int a)
{
    int i;
    a=a-2;
    str[1]=str[0]+2;
    for(i=0;i<=3;i++)
        str[i]=str[i]+1;
}

void main()
{
    int p=4,i;
    char str[4]={'a','l','e','A'};
    func(str,p);
    for(i=0;i<=3;i++)
        printf("%c\n",str[i]);
    printf("%d\n",p);
}

```

a	x	e	A
0	1	2	3

Output

f	d
o	o
p	q

b) Describe call by value and call by reference with examples.

b) Write a function IsPerfect(int a) that returns 1 if the parameter variable a is a perfect number, otherwise 0. Also write a main function that calls the IsPerfect(a) function and displays first n perfect numbers where n is the input from user.

c) Find the output of the following program segment:

```

void main()
{
    int r, p, q, sum;
    sum=0;
    for(r = 1 ; r <= 3 ; r++)
        {
            for( p = 1 ; p <= 3 ; p++)
                {
                    for( q = 1 ; q <= 3 ; q++)
                        {
                            printf("%d %d %d , sum: %d \n",r, p, q, r+p+q);
                        }
                }
        }
}

```

a) What are the advantages of using functions? Write down the difference between local and global variables. 4

b) Write a program to display all the prime numbers from a 2D array and also to find and display their sum. 5

Sample Input/Output:

Enter n=3

6 2 34

52 3 21

3 9 1

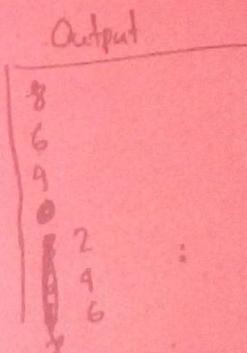
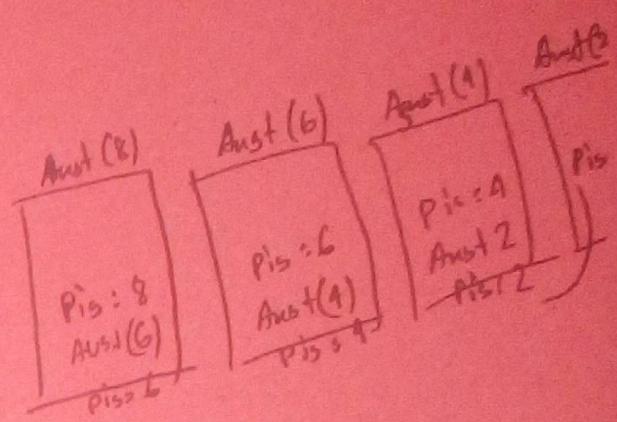
Prime numbers: 2 3 3

Sum is : 8

c) Find the output of the following program segment:

```
int AUST(int p)
{
    if(p==2)
        return 0;
    printf("P is : %d\n",p);
    AUST(p-2);
    p=p+2;
    printf("P is : %d\n",p);
}
```

```
void main()
{
    int n,res;
    n=9;
    res= AUST (n-1);
    printf("Result value: %d\n", res);
}
```



6 a) What is pointer? Describe the use of "malloc" function with an example. 4

b) Write a program to count the frequencies of each character present in a text (string). The string must be passed to the function as an argument. 5

Sample Input/Output:

Enter text: cse google

Frequencies of each character:

"c": 1; "s": 1; "e": 2; "g": 2; "o": 2; "l": 1

- c) Find the output of the following program segment:

```

void func(int *p)
{
    int k;
    for(k=0;k<4;k=k+1)
    {
        printf("Value :: %d \n",*(p+k));
        printf("Address %p \n", p+k );
    }
    printf("Content of P is : %p , Address of p is:: %p\n", p, &p);
}

void main()
{
    int num[4]={2,5,3,9};
    func(num);
}

```

Name	Address
num[0]	D001
num[1]	D003
num[2]	D005
num[3]	D007

a) What is the use of `typedef` keyword? Explain bitwise operators with an example. 4

b) Write a program to take name, age, city and two phone numbers as input for 5 employees in an array of structures and display only the information of employees who lives in Dhaka city. You can use `strcmp` function. 5

Structure Name : employee

name	char array
age	int
city	char array
phone no	char 2D array

c) Write a program to calculate x to the power n (x^n) using recursion. Explain how it works for $x=2$ and $y=3$. 5

Date : 15/03/16

AHSANULLAH UNIVERSITY OF SCIENCE AND TECHNOLOGY

Final Examination of Fall Semester 2015

Department of Arts and Sciences

Program: B. Sc. in Computer Science & Engineering

1st Semester of 1st Year

Course Code: HUM 1107; Course Title: Critical Thinking and Communication

Time: 3 hours

Full Marks: 70

Section 1: Critical Thinking

There are 7 (seven) questions in this section. Answer any five of them.

(Marks allocated are indicated in the right margin.)

✓ Question#1

Define argument, and illustrate it with an example. 7

✓ Question#2

What is a fallacy? Give an example with explanation. 7

✓ Question#3

What is a 'premise' in an argument? Exemplify. 7

✓ Question#4

'An inductive argument gives us probability, not guarantee'. Explain with an example. 7

✓ Question#5

Explain whether the following groups of statements make arguments or fallacies:

a. "Animal experimentation reduces our respect for life. If we do not respect life, we are likely to be more and more tolerant of violent acts like war and murder. Soon our society will become a battlefield in which everyone constantly fears for his or her life. It will be the end of civilization. So, to prevent this terrible consequence, we should make animal experimentation illegal right now."

b. All numbers ending in 0 or 5 are divisible by 5. The number 35 ends with a 5. So, it is divisible by 5. Doing

✓ Question#6

What are the strategies for making rational decisions? Discuss. 7

✓ Question#7

"Critical thinking is essential for living a meaningful life." Do you agree? 7

Discuss the reasons in support of your answer.

Section II: Communication

There are 7 (seven) questions in this section. Answer any five of them.
(Marks allocated are indicated in the right margin.)

Question#8

Compose a paragraph on any one of the following topics in about 100 words: 7

- How to Keep Our Environment Clean
- Your Life Now and the Same Five Years Ago

Question#9

Turn the following expressions into polite questions: (Use 'would you mind, can you tell me, I wonder, Do you have any idea, I don't know, I am not sure, Do you happen to know') 7x1=7

- What time is it?
- Where are the laboratories?
- Where does he work?
- What time did the car get in?
- Was the flight delayed?
- What time did the meeting start?
- Does the price include sales tax?

Question#10

Suppose that you are the Head of Maintenance of Skyline IT Limited, Banani, Dhaka. You are in need of 30 computers for your departmental staff. Draft a proposal to the General Manager of the company for providing you with the computers.

Question#11

Eastern Horizon IT Limited, Riyadh, Saudi Arabia needs some Data Base Engineers. They have advertised for the post in the daily Gulf Times newspaper on 15 January 2016. Draft a job application in response to the advertisement. (You do not need to prepare a CV)

Question#12

Suppose that your university is planning to introduce a bus service for the students. For this purpose the Registrar of the university has asked you to make a survey as to what percentage of students would like to avail this opportunity. Based on your findings, draft a report to the Registrar with a recommendation.

Question#13

There are seven errors in the passage below. Copy the passage in your answer script correcting the errors. 7

Maria is a second year university. She is working on a degree in Special Education. She works as a camp counselor every summer. The camp is a special camp for childs with physical and mental disadvantages. Maria helps the kids get exercise and make better their social skills. She takes the kids swimming every afternoon in the summer. They goes bowl once a week. The children really like the camping out in tents. Maria always have wanted work with kids with disabilities. She is looking forward to having a career in Special Education.

Question#14 Read the following passage, and then answer the following questions: 1x7=7

Persuasion is the art of convincing someone to agree with your point of view. According to the ancient Greek philosopher Aristotle, there are three basic tools of persuasion: ethos, pathos, and logos.

Ethos is a speaker's way of convincing the audience that she is a credible source. An audience will consider a speaker credible if she seems trustworthy, reliable, and sincere. This can be done in many ways. For example, a speaker can develop ethos by explaining how much experience or education she has in the field. After all, you would be more likely to listen to advice about how to take care of your teeth from a dentist than a firefighter. A speaker can also create ethos by convincing the audience that she is a good person who has their best interests at heart. If an audience cannot trust you, you will not be able to persuade them.

Pathos is a speaker's way of connecting with an audience's emotions. For example, a speaker who is trying to convince an audience to vote for him might say that he alone can save the country from a terrible war. These words are intended to fill the audience with fear, thus making them want to vote for him. Similarly, a charity organization that helps animals might show an audience pictures of injured dogs and cats. These images are intended to fill the viewers with pity. If the audience feels bad for the animals, they will be more likely to donate money.

Logos is the use of facts, information, statistics, or other evidence to make your argument more convincing. An audience will be more likely to believe you if you have data to back up your claims. For example, a commercial for soap might tell you that laboratory tests have shown that their soap kills all 7,000,000 of the bacteria living on your hands right now. This piece of information might make you more likely to buy their brand of soap. Presenting this evidence is much more convincing than simply saying "our soap is the best!" Use of logos can also increase a speaker's ethos; the more facts a speaker includes in his argument, the more likely you are to think that he is educated and trustworthy.

Although ethos, pathos, and logos all have their strengths, they are often most effective when they are used together. Indeed, most speakers use a combination of ethos, pathos, and logos to persuade their audiences. The next time you listen to a speech, watch a commercial, or listen to a friend try to convince you to lend him some money, be on the lookout for these ancient Greek tools of persuasion.

Questions:

- a. As used in paragraph 2, what is the best antonym for **credible**?
- b. Amy is trying to convince her mother to buy her a pair of \$200 shoes. She says: "Mom, the shoes I have are really old and ugly. If I don't get these new shoes, everyone at school is going to laugh at me. I will be so embarrassed that I will want to die." What form of persuasion is Amy using here?
- c. How can logos build ethos according to the passage?
- d. Gareth is running for mayor. He tells his audience: "Under our current mayor, there have been 15,000 new cases of unemployment. If he stays in office, who knows how many more people will lose their jobs? The number could go up even higher. When I was the CEO of Magnatech, I helped to create over 1,000 new jobs. I can do the same thing for this city if you vote for me." Which form of persuasion is Gareth using here?
- e. According to the passage, what is the most effective tool of persuasion?
- f. Imagine you wanted to convince an uninformed person to take a political position that is the same as yours. How would you convince him?
- g. Some persuasive methods involve only ethos, some involve only pathos, and some involve only logos. Which of these single-tactic persuasion types do you find most effective? Which ones are least effective? Why?

Ahsanullah University of Science and Technology

Final Examination of Fall Semester, 2015

Department of Arts and Sciences

Program: Bachelor of Science in Computer Science and Engineering

1st Semester of 1st Year

Course No.: PHY - 1115

Time: 3 (three) hours

There are 7 (seven) questions. Answer any 5 (five) taking at least 1 (one) from each group.

(Marks allotted are indicated in the right margin)

Course Title: Physics

Full Marks: 70

Group - A

1. a) Define forced vibration. Distinguish between simple harmonic vibration and forced vibration. [4]
- b) Write the differential equation of forced vibration and obtain its solution. Explain resonance and resonant frequency with graphical representation. [8]
- c) A body of mass 5 kg is suspended by a spring which stretches 0.1 m when the body is attached to it. It is then displaced downward an additional 0.05 m and released. Calculate the force constant of the spring and time period of oscillation. [2]

2. a) What do you understand by traveling wave? Write the properties of traveling wave. [5]
- b) For a traveling wave show quantitatively that the energy density is independent of the displacement of the wave. [7]
- c) An electrically maintained fork of frequency 100 Hz sends out waves of amplitude 2×10^{-3} cm. Find the (i) energy radiated per cm^3 of the medium and (ii) intensity of sound wave in ergs/ $\text{s}\cdot\text{cm}^2$. Velocity of sound is 330 m/s and density of the medium is 0.001293 g/cm^3 . [2]

Group - B

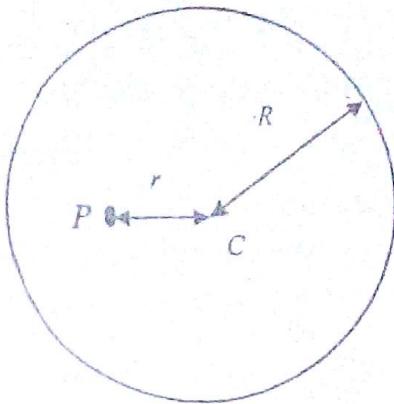
3. a) What are coherent sources? Why are they necessary to observe interference of light on screen? [3]
- b) In Newton's rings due to reflected light, obtain expressions for the diameter of the dark and bright rings. Hence show that the central fringe is dark. [8]
- c) A Newton's ring apparatus is used to determine the radius of curvature of a lens. The radii of the n^{th} and $(n+20)^{\text{th}}$ bright rings are measured and found to be 0.162 cm and 0.368 cm, respectively, in light of wavelength 546 nm. Calculate the radius of curvature of the lower surface of the lens. [3]

4. a) What are the differences between Fresnel and Fraunhofer class of diffractions? [3]
- b) For Fraunhofer diffraction due to single slit show that $I = I_0(\sin a/a)^2$, where the symbols have their usual meaning. Hence obtain the intensity of the first secondary maxima. [8]
- c) In Fraunhofer diffraction due to single slit, the screen is at a distance of 100 cm from the slit and the slit is illuminated by a light of wavelength 5893 Å. The width of the slit is 0.1 mm. Calculate the separation between the central maximum and the first secondary minimum. [3]

5. a) What is grating? What are the uses of grating? [2]
 b) State and prove Malus law of polarization of light. [4]
 c) Obtain an expression for the dispersive power of grating. Hence show that the dispersion is minimum for central maximum. [5]
 d) Light traveling in water of index of refraction 1.33 is incident on a plate of glass of index of refraction 1.53. At what angle of incidence is the reflected light completely linearly polarized? [3]

Group - C

6. a) State and explain Ampere's law. Discuss its advantages and disadvantages. [5]
 b) Consider a conducting wire of radius R carrying current I . The cross section of the wire is shown in Fig. 1. [6]



$$\text{take } \frac{4\pi r}{72}, B = \frac{\mu_0 I}{2\pi r} \text{ present } F = ?$$

Applying Ampere's law, find an expression for magnetic field at point P at a distance r from its center.

- c) A long straight wire carries a current of 20 amperes. An electron is at a distance of 2 cm from the wire and is traveling with a velocity of 10^7 m/s towards the wire. Calculate the force acting on the electron. [3]
7. a) Classify solids on the basis of energy band theory. [6]
 b) What are semiconductors? Explain their properties. [4]
 c) Explain why the resistance of the semiconductor decreases with rise in temperature. [2]
 d) What is doping? What is the purpose of adding impurity to intrinsic semiconductor? [2]

Date : 21/03/16

Ahsanullah University of Science and Technology

Final Examination of Fall Semester 2015

Department of Arts and Sciences

Program: B. Sc. in Computer Science and Engineering

1st Semester of 1st Year

Course No: Math -1115

Course Title: Mathematics-I

Time: 03 (three) hours

Full Marks: 70

There are 7 (seven) questions. Answer 5 (five) questions, taking any 3 (three) from Group A and 2 (two) from Group B. Marks allotted are indicated in the right margin.

Group-A

1. (a) Find $\lim_{x \rightarrow 0} (\cos x)^{\tan^2 x}$, (ii) $\lim_{x \rightarrow 0} \frac{\sin(\sin x)}{x}$ [4]

- (b) Define continuity of a function. Where are each of the following functions discontinuous? (i) $f(x) = \frac{x^2 - x - 6}{x - 3}$, (ii) $f(x) = \begin{cases} \frac{1}{x^2} & \text{if } x \neq 0 \\ 1 & \text{if } x = 0 \end{cases}$ [5]

$$(iii) f(x) = \begin{cases} \frac{x^2 - x - 6}{x - 3} & \text{if } x \neq 3 \\ 3 & \text{if } x = 3 \end{cases}$$

Also sketch the graphs.

- (c) Test the differentiability of the following function at $x = 0$ [5]

$$f(x) = \begin{cases} 5x^2 \sin(1/x), & \text{when } x \neq 0 \\ 0 & \text{when } x = 0 \end{cases}$$

2. (a) Explain with graphs where a function $f(x)$ is not differentiable. [4]

- (b) (i) Find $\frac{dy}{dx}$, if $(y)^x + (x)^y + e^{2xy} + \ln(xy) + \sin(xy) = a^b$, [5]

- (ii) Compute y_n , if $y = \ln(ax+b)$

- (c) State Leibnitz's Theorem. If $y = m \cos^{-1} x$, then prove that [5]

$$(i) (1-x^2)y_2 - xy_1 - m^2 y = 0, (ii) (1-x^2)y_{n+2} - (2n+1)xy_{n+1} - (m^2 + n^2)y_n = 0.$$

3. (a) State Euler's theorem on homogeneous function for three variables. [4]

If $u = \frac{1}{\sqrt{x^3 + y^3 + z^3}}$ then prove that $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} + z \frac{\partial u}{\partial z} = -\frac{3}{2}u$.

- (b) Explain the point of inflection of a function. Calculate the maximum and minimum [5]

values of $y = \frac{4}{x} + \frac{12}{y}$ and $x+y=4$.

[5]

- (c) Let $z = F(u, w, x)$, where $u = f(x, y)$ and $w = g(x, y)$
- Find a general expression for $\frac{\partial z}{\partial x}$.
 - Verify your answer to (i) if $F(u, w, x) = w^3 - 2ux$, $f(x, y) = 4xy - x + 1$ and $g(x, y) = y + xy^2$.
4. (a) What is the slope of tangent line to the curve $y^4 + x = xy(x + y)$ at the point $(1, 1)$? Also find the equation of tangent and normal [4]

[5]

- (b) Find the curvature and radius of curvature at $(0, b)$ of the curve $\frac{x^2}{a} + \frac{y^2}{b} = 1$.
- (c) Find the equation of the asymptote of the curve $x^3 + x^2y - xy^2 - y^3 + 2y^2 + 2xy - 3x + y = 0$. [5]

Group-B

5. (a) Transform the equation $9x^2 + 24xy + 2y^2 - 6x + 20y + 41 = 0$ in rectangular coordinates so as to remove the terms x, y and xy . [7]
- (b) Prove that the equation $2x^2 + xy - y^2 - x - 7y - 10 = 0$ represents a pair of straight lines; find them and also their point of intersection and the equation of the bisectors of the angle between the lines. [7]
6. (a) Find the equation of the circle touching the line $2y = 3x$ at $(2, 3)$ and passing through $(4, 5)$. Find also coordinates of the centre and radius of the circle. [4]
- (b) Obtain the limiting points of the co-axial system of circles determined by $x^2 + y^2 + 2x + 5 = 0$ and $x^2 + y^2 + 2y + 5 = 0$. [5]
- (c) Find the equation of the circle whose diameter is the common chord of the circles $x^2 + y^2 + 6x + 2y + 6 = 0$ and $x^2 + y^2 + 8x + y + 10 = 0$. [5]
7. (a) Find the projection of the join of points $(-1, -1, 3)$ and $(2, 0, 1)$ on the line through the points $(-7, 5, 3)$ and $(2, 6, 8)$. [4]
- (b) Show that the following two planes are parallel

$$2x - y - 2z + 6 = 0$$

$$4x - 2y + 4z + 9 = 0$$
. [5]
- Hence find the shortest distance between them.
- (c) Show that the lines $\frac{x+1}{2} = \frac{y-2}{2} = \frac{z}{1}$ and $\frac{x-1}{6} = \frac{y+1}{1} = \frac{z-3}{5}$ are coplanar. Also find their point of intersection and obtain the equation of plane containing them. [5]