

**International Islamic University Chittagong
Morality Development Program (MDP)**

Semester End Examination, Spring- 2023
2nd Semester

Course Title: Tajweedul Quran - II
Time: 2.50 Hours

Course Code: MDP-1202
Full Marks: 50

Answer any 5 (five) of the following questions

5x10

1. Write the meaning of following Surahs (any two) .

Surah Al-Quraish(القریش)

Surah Al Asr(العصر)

Surah A Humazah(الهمزة)

2. Write the impact of *Salah* (Namaaz) on human life .

3. Give one verse from *Qur'an* & one *Hadith* of Prophet (SM) on importance of *Salah*.

4. Mention the starting and ending time of five daily prayers (*Salah*).

5. Write down the meaning of *Tashahhud* properly

6. How to perform *Salat al witr*?

7. What is the story of *Surah Fee'l*? Mention the teachings of this story.

(Answer all questions; the columns on the right-side indicate the marks, CLOs and Bloom's taxonomy-domain for each question):

#	Questions	Marks	CLOs	Bloom's taxonomy domain
1	a) "Ibadah is a comprehensive and phenomenon term that includes all aspects of human life"- explain this statement describing the definition and conditions of Ibadah. Or, b) Who are 'Ibadur Rahman (Allah's believers)? Explain their characteristics in the light of Surah Al-Furqan.	10	3	Remember & Create
2	a) "Salah is the key to Paradise"- explain this Hadith mentioning the Shurut (prerequisites) and Arkan (pillars) of Salah. Or, b) Illustrate a picture of how the Salah changes our individual and collective life.	10	3	Remember & Create
3	Provide a scenario of the Zakah distribution culture of your society. Outline a proper method of distribution of Zakah to eradicate poverty from your society.	10	3	Understand & Analyze
4	"Fasting is only for me and I will give reward for it"- justify this Hadith explaining the importance of Sawm elaborately.	10	3	Evaluate & Create
5.	"Take the method of Hajj from me"- justify this Hadith explaining the impact of Hajj on our present life as the revival of Muslim Ummah.	10	3	Evaluate & Create

International Islamic University Chittagong
 Department of Computer Science & Engineering
B. Sc. in CSE Semester Final Examination, Spring-2023
 Course Code: CSE-1221 Course Title: Computer programming-II
 Total marks: 50 Time: 2 hours 30 minutes

Course Outcomes (COs) of the Questions

CO1	Identify basic input/output system
CO2	Illustrate the basic features of OOP such as polymorphism, inheritance etc.
CO3	Demonstrate familiarity with the use of Class library of a standard OOP language

Bloom's Levels of the Questions

Letter Symbols	R	U	App	An	E	C
Meaning	Remember	Understand	Apply	Analyze	Evaluate	Create

Answer the questions. The figures in the right-hand margin indicate full marks.

GROUP-A

- 1 a) Define operator overloading? Difference between Member and friend function. 2 CO1 R
- b) Overload – (negative) operator for both as a binary operator and as a unary operator. 3 CO2 App
Or,
 Write a program of using the following statement properly with a C++ program:
 $Ob2 = 50 + Ob1$
- c) Write a program to overload ++ using member function. 3 CO2 App
Or,
 Construct a program to overload logical AND (&&) operator using member function.
- d) Correct the following codes: 2 CO2 U

```
#include<iostream>
using namespace std;
class A{
    int a, b;
public:
    A(int i, int j){
        a = i;
        b = j;
    }
    operator + (int i = 12){
        A temp;
        temp.a = a + i;
        temp.b = b + i;
    }
    void show(){
        cout >> a >> b >> endl;
    }
};
void main(){
    A ob1(10,5), ob2;
    ob2 = ob1 + 10;
    ob2.show();
}
```

GROUP-B

2 a) How do the properties of the following two derived classes differ?

2 CO2 U

class D1: private B{ //.....}

class D2: public B{ //.....}

Or,

How to invoke Base class's parameterized constructor inside Derived class's parameterized constructor?

b) Write a program to implement multilevel inheritances.

3 CO3 App

Or,

What is virtual base class? Explain with writing a program.

c) Is there any error in this code? If yes, then correct the code. Display the output.

2 CO2 U

class A

```
{  
    public:  
        void cheers()  
        {  
            cout<<"Class A: Hip-hip-hooray";  
        }  
    };  
    class B  
    {  
        public:  
            void cheers()  
            {  
                cout<<"Class B: Hip-hip-hooray";  
            }  
        };  
    class C:public A, public B  
    {  
    };  
    int main()  
    {  
        C obc;  
        obc.cheers();  
    }
```

d) Create a base class called vehicle that stores the number of wheels a vehicle has and the range of vehicle. Create a derived class called car that inherits vehicle and also store the number of passengers. Then, create a derived class called truck that inherits vehicle and also stores the information of load limit. Display the information

3 CO3 App

3 a) Write a complete program that shows the uses of virtual function.

4 CO3 App

b) What do you know about early binding and late binding? Discuss the pros and cons of them.

3 CO1 R

[N.B. GROUP-A (QUESTION NO: 1&2) and GROUP-B (QUESTION NO: 3, 4,5)]

c) Correct the errors in the following program

3 CO2 U

```
class test
{
    private:
        int m;
    public:
        void getdata()
        {
            cout<<"Enter number";
            cin>> m;
        }
        void display()
        {
            cout << m;
        }
    };
main()
{
    test T;
    T->getdata();
    T->display();
    Test *p;
    P=new test;
    p.getdata();
    (*p).display();
}
```

- 4 a) Suppose you have a program that performs addition operations for different data types: integers, floating-point numbers, and strings. The original program provides separate functions for each data type (Add for integers, Add for doubles, and Add for strings).

4 CO2 U

Your task is to re-factor the code using a generic function called Add. The Add function should be capable of performing addition operations for any data type.

Output:

Adding two integers: 5 and 10.

Adding two floating-point numbers: 3.14 and 2.71.

Concatenating two strings: "Hello" and "World".

Or,

You are provided with a program that calculates the average of elements in an array for different data types: integers, floating-point numbers, and characters. The original program contains separate functions for each data type (Calculate Average for integers, Calculate Average for doubles, and Calculate Average for characters).

Your task is to re-factor the code using a generic function called Calculate Average. The Calculate Average function should be capable of calculating the average of elements for any data type.

Output:

Calculating the average of an array of integers: {10, 20, 30, 40, 50}.

Calculating the average of an array of floating-point numbers: {3.5, 4.7, 2.9, 6.1, 1.8}.

Calculating the average of an array of characters: {'A', 'B', 'C', 'D', 'E'}.

- b) Write a program that initializes a list with the values {10, 20, 30, 40, 50}. Perform 3 CO1 U
the following operations:

Remove the element at index 2.

Insert the value 15 at index 1.

Remove the first element from the list.

c) What is an exception? What are the advantages of using exception handling 3 CO3 App
mechanism in a program?

- 5 a) Write stream classes hierarchy for console I/O operations. 3 CO1 R

Or,

Formulate the difference between manipulators and ios member functions.

- b) Write a program to generate a file named "Numbers.txt" that contains 50 floating-point numbers between 0 and 1. Then, read the contents of the file and display them 4 CO3 App
on the screen.

Implement the program, generate the file with the specified numbers, read the contents from the file, and display them on the screen.

Please provide the complete program and the displayed numbers on the screen.

- c) Write a program that implements following functions: 3 CO3 App

- i) Width()
- ii) Precision()
- iii) Fill()

Or

Create a user-defined manipulator that formats a floating-point number to be displayed as follows:

- i) 12 columns width
- ii) Right-justified
- iii) Four digits precision
- iv) Filling of unused places with zeros

International Islamic University Chittagong
Department of Computer Science and Engineering

B. Sc. in CSE

Final Exam, Spring-2023

Course Title: Physics-II

Course Code: PHY 1201

Time: 2 hours 30 minutes

Full Marks: 50

The figures in the right-hand margin indicate full marks

Part A

[Answer the questions from the followings]

1. a) Define crystal systems. Write the seven crystal systems with example.
1. b) Show that in a crystal of cubic structure, the distance between the planes with Miller indices h, k, l is equal to $d = \frac{a}{\sqrt{h^2+k^2+l^2}}$, where a is the lattice parameter.

CO1 R 3
CO1 U 5

Define coordination number. Explain coordination number for NaCl structure.

1. c) Lead is face-centered cubic with an atomic radius of $r = 1.674$ A.U. Find the spacing of (220) planes.
2. d) How many types of crystal defects in solid? Explain all of the crystal defects.
OR,
Distinction between metal, insulator and semiconductor in terms of energy band.
2. e) Show that the packing fraction for an fcc lattice is ~ 0.74 and hence write the meaning of this number.

CO2 E 2

CO1 U 5

CO2 A 5

Part B

[Answer the questions from the followings]

CO1 R 2

CO1 U 5

CO2 E 3

3. a) State the postulates of the special theory of relativity.
3. b) Explain "A moving clock always appears to go slow".
3. c) The length of a spaceship is measured to be exactly half its actual length. Calculate
 - (i) the speed of the spaceship
 - (ii) the time dilation corresponding to one second on the spaceship.
4. a) Calculate the following properties of ${}^6C^{12}$ particle:

i. Nuclear Mass	ii. Nuclear Size
iii. Nuclear Density	iv. Nuclear Charge
v. Nuclear Mass defect	vi. Nuclear Binding Energy
vii. Nuclear Binding Energy per nucleon.	

CO2 E 7

4. b) Calculate the glancing angle on the cube (110) of a rock salt crystal ($a = 2.81$ Å) corresponding to second order diffraction maximum for the X-rays of wavelength 0.71 Å.

CO2 E 3

CO1 U 7

5. a) State the laws of radioactive disintegration and prove it.
OR,
Show that, the mean life of a radioactive atom is the reciprocal of the radioactive constant.

5. b) The half life of a radioactive substance is 30 days. Calculate
 - (i) The radioactive decay constant
 - (ii) The mean life
 - (iii) The time taken for $\frac{1}{4}$ of the original number of atoms to disintegrate.

CO2 E 3

OR,

Calculate the time required for 10% of a sample of thorium to disintegrate. Assume the half-life of thorium to be 1.4×10^{10} years.

(i) The figures in the right-hand margin indicate full marks

(ii) Course Outcomes and Bloom's Levels are mentioned in additional Columns

Course Outcomes (COs) of the Questions

CO1	Understand fundamental concept of different discrete structures like set, function, relation, graph, tree etc. and their properties. Also, the concept of different types of formal logic and mathematical reasoning, Graphs and trees
CO2	Apply the concept of formal logic, mathematical reasoning various concepts of number theory and combinatorics, Graphs and trees

Bloom's Levels of the Questions

Letter Symbols	R	U	Ap	An	E	C
Meaning	Remember	Understand	Apply	Analyze	Evaluate	Create

GROUP-A

Q1. a) Find all incongruent solutions to the following:

4 CO DL
CO1 C3

- i) $7x \equiv 3 \pmod{15}$
- ii) $x^2 \equiv 1 \pmod{8}$

OR

✓ Find value of x using Chinese remainder theorem

$$x \equiv 1 \pmod{2}$$

$$x \equiv 2 \pmod{3}$$

$$x \equiv 3 \pmod{5}$$

b) Find the highest common factor of 34, 42 and 58.

2 CO2 C3

OR

Find the prime factorization of 118724.

✓ Express gcd (252, 198) as a linear combination of 252 and 198. Show the steps.

3 CO2 C3

✓ Write down the applications of Congruence

1 CO1 C2

Q2. a) Prove that

4 CO2 C3

$$\sum_{j=0}^n \left(-\frac{1}{2}\right)^j = \frac{2^{n+1} + (-1)^n}{3 \cdot 2^n}$$

Whenever n is nonnegative integer

OR

✓ Use mathematical induction to show that 3 divides $n^3 + 2n$ whenever n is a positive integer.

Q1 Let $P(n)$ be the statement that $1^3 + 2^3 + \dots + n^3 = (n(n+1)/2)^2$ for the 6 CO2 C3 positive integer n .

- a) What is the statement $P(1)$?
- b) Show that $P(1)$ is true, completing the basis step of the proof of $P(n)$ for all positive integers n
- c) What is the inductive hypothesis of a proof that $P(n)$ is true for all positive integers n ?
- d) What do you need to prove in the inductive step of a proof that $P(n)$ is true for all positive integers n ?
- e) Complete the inductive step of a proof that $P(n)$ is true for all positive integers n , identifying where you use the inductive hypothesis.
- f) Explain why these steps show that this formula is true whenever n is a positive integer

GROUP-B

Q3. a) State the generalized pigeonhole principle. What is the minimum of students required in a Discrete Mathematics class to be sure that at least eight will receive the same grade, if there are four possible grades, namely A+, A, A- and F. 3 CO2 C2

- b) Write some applications of Sum and product rule. 2 CO1 C2
c) The "hello, world" problem for the pigeonhole principle is the "sock problem": In your dresser drawer you have a jumble of socks in two colors, say blue and gray. It's dark, and you don't want to wake your spouse.
1) How many socks must you grab to guarantee that you have a pair of the same color?
2) How many socks must you grab to guarantee that you have 3 socks of the same color?

Or,

You have pens of many colors. In the drawer there are 43 black pens, 2 red pens, 23 blue pens and 8 orange pens. What is the minimum numbers of pens you need to take off from the drawer in order to be certain that you have taken four pens of same colors?

d) How many different license plates can be made if each plate contains a sequence of three uppercase English letter followed by three digits? 2 CO1 C2

Or,

How many bit strings of length eight either start with a 1 bit or end with the two bits 00?

Q4. a) Define with example:

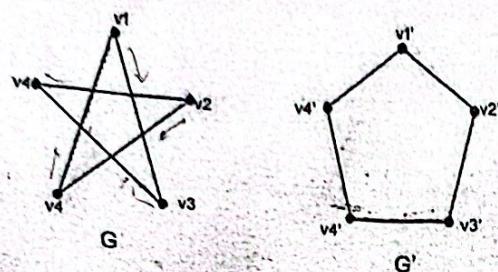
- i) Complete graph ii) Bipartite Graph

2 CO1 C1

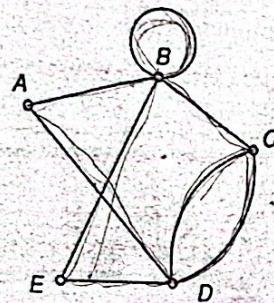
Or,

Draw Two graph K_5 , $K_{3,4}$

b) What do you mean by isomorphism of graphs? Determine whether the following two graphs are isomorphic or not. 3 CO2 C3

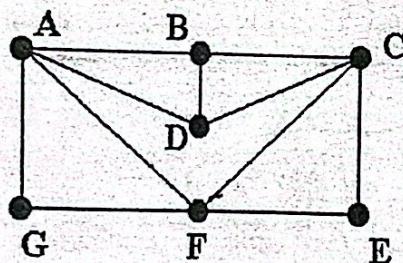


c) Determine whether the following graph has a Euler circuits or path yes or not? Construct such a circuit or path if exists. 3 CO3 C3

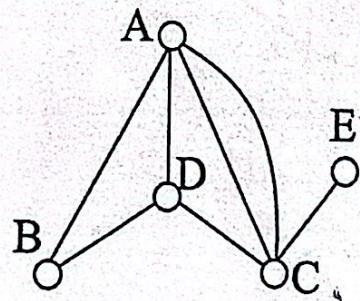


Or

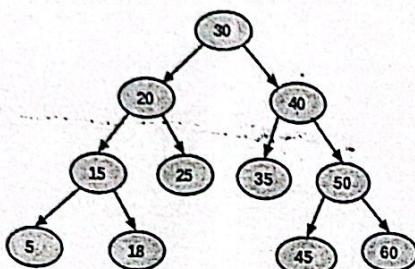
Determine whether the following graph has a Hamiltonian circuits or path yes or not? Construct such a circuit or path if exists.



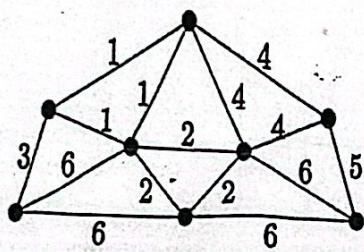
d) Find adjacency list and matrix of the following graph. 2 CO2 C2



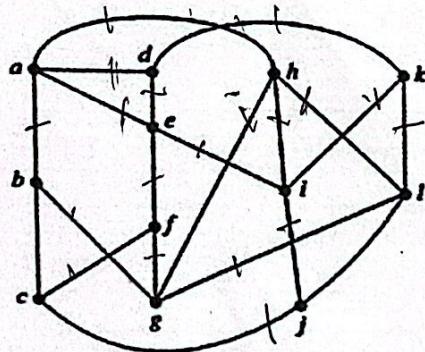
Q5 a) What do you mean by tree traversing? Find inorder, preorder and postorder traversal of the following tree. 3 CO3 C2



b) Define minimum spanning. Construct a minimum spanning tree of the following graph. 4 CO2 C3



c) What is a spanning tree? How many edges must be removed from a connected graph with n vertices and m edges to produce a spanning tree? 3 CO2 C3
Find a spanning tree for the following graph.





International Islamic University Chittagong (IIUC)
Department of Computer Science and Engineering (CSE)
Semester Final Examination

Program: B. Sc. in CSE

Course Code: MATH-1207

Time: 2;30 hours

Semester: Spring-2023

Course Title: Mathematics-II

Total Marks: 50

- (i) Answer all the questions. The figures in the right-hand margin indicate full marks.
- (ii) Please answer the several parts of a question sequentially.
- (iii) Separate answer script must be used for separate group.
- (iv) Course Learning Outcomes (CLOs) and Bloom's Levels are mentioned in additional Columns.

Course Learning Outcomes (CLOs) of the Questions

CLO2:	Solve differential equations using various methods.					
CLO3:	Formulate the mathematical model and interpret the results by analyzing the real-world problems related to Growth and Decay Problems, Temperature Problems, Falling Body Problems, Dilution Problems, Electrical Circuits problems etc. through a set of differential equations.					

Bloom's Taxonomy Domain Levels of the Questions

Letter Symbols	R	U	Ap	An	E	C
Meaning	Remember	Understand	Apply	Analyze	Evaluate	Create

Group - A

1. a) Define order and degree of a differential equation with example. Form the differential equation of which $xy = pe^x + qe^{-x}$ is the complete integral. 5 CLO2 DL R&U
- b) Define homogeneous function with example. 5 CLO2 R&U
 Solve: $y^2 + x^2 \frac{dy}{dx} = xy \frac{dy}{dx}$
- Or) Solve the linear differential equation, $x \frac{dy}{dx} + 2y = x^2 \log x$ 5 CLO2 R&U
2. a) Define Bernoulli's differential equation. 5 CLO2 R&U
 Solve the Bernoulli's differential equation, $\frac{dy}{dx} + xy = x^3 y^3$
- Or) Test whether the differential equation, $(x - 2e^y)dy + (y + xsinx)dx = 0$ is exact or not hence solve it. 5 CLO2 U
 Solve: $\frac{d^3 y}{dx^3} - 3 \frac{d^2 y}{dx^2} + 4 \frac{dy}{dx} - 2y = e^{-2x} - \cos x$.

Group - B

- | | | Marks | CLO | DL |
|---|---|-------|------|-----|
| 3. | a) Define Bessel's function. Show that
$\sqrt{\left(\frac{1}{2}\pi\right)} J_{-\frac{1}{2}}(x) = -\sin x - \frac{\cos x}{x}$ | 5 | CLO2 | R&U |
| | b) Define Legendre's equation. Using the Rodrigue's formula evaluate the values of $P_3(x)$ | 5 | CLO2 | R&U |
| 4. | a) Solve the differential equation $(D^2 + 4)y = 4 \tan 2x$ by using the method of Variation of parameters | 5 | CLO2 | U |
| | b) Solve the following linear partial differential equation by Lagrange's method: $(y^2 + z^2 - x^2)p - 2xyq + 2xz = 0$ | 5 | CLO2 | R&U |
| Or) Solve the non-linear partial differential equations by Charpit's method, $px + qy = pq$ | | | | |
| 5. | a) The body of a murder victim was discovered at 11:00 pm. The doctor took the temperature of the body at 11:30 p.m. which was $94.6^\circ F$. He again took temperature after one hour when showed $93.4^\circ F$ and noticed that the temperature of the room was $70^\circ F$. Estimate the time of death. [Normal temperature of human body is $98.6^\circ F$] | 5 | CLO3 | Ap |
| | b) A spring for which $k = 700 \text{ Nm}^{-1}$ hangs in a vertical position with its upper end fixed. A mass of 7 kg is attached to the lower end. After coming to rest, the mass is pulled down 0.05 m and released. Discuss the resulting motion of the mass, neglecting air resistance. | 5 | CLO3 | Ap |
| Or
A generator having emf 100V is connected in series with a 10Ω resistor and an inductor of $2H$. If the switch k is closed at time $t = 0$, Obtain a differential equation for the current and determine the current at time t. | | | | |