

Bismillahir Rahmanir Rahim
International Islamic University Chittagong
Department of Computer Science & Engineering
B. Sc. in CSE Semester Final Examination, Spring-2022
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

CO DL

Bloom's Levels of the Questions						
Letter Symbols	R	U	App	An	E	C
Meaning	Remember	Understand	Apply	Analyze	Evaluate	Create

Group-A

1. a) Define operator overloading? Write the rules of operator overloading. 2 CO1 R
 b) Create a class float that contains one float data member. Overload an arithmetic operator so that it can operate on the objects of float. 3 CO3 App
 Or
 Construct a program to overload logical AND (&&) operator using friend function.
 c) A friend function cannot be used to overload the assignment operator (=). Explain why? 3 CO2 U
 d) Answer the following question with necessary example and explanation
 i) When an operator is overloaded, does it lose any of its original functionality?
 Or
 ii) Can the precedence of an overloaded operator be changed? Can the number of operand be altered?
 2.a) "A derived class can access all the members of its base class." -Is this statement true? Justify your answer. 2 CO2 U
 Or
 In inheritance, explain why the protected category is needed?
 b) Write a program to implement multiple inheritance. 3 CO2 U
 Or
 What is virtual base class? Explain with writing a program.
 c) How to invoke Base class's parameterized constructor inside Derived class's parameterized constructor? Give example. 3 CO2 U

- d) Write the output for the following code:

```

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();
}

```

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

Group-B

- 3.a) What is virtual function? Explain with example. 3 CO2 U
- b) What do you know about early binding and late binding? Discuss the pros and cons of them. 3 CO1 R
Or
When a virtual function is called pure virtual? Write an appropriate program to make your understanding clear.
- c) Write a complete program that shows the uses of virtual function. 4 CO2 U
- 4.a) What is an exception? What are the advantages of using exception handling mechanism in a program? 4 CO2 U
Or
Show the general form of try, catch and throw for exception handling. In your own words describe their operations.
- b) Write a generic function, called min (), that returns the lesser of its two arguments. 3 CO3 U
- c) What is generic function and generic class? 3 CO3 R
Or
What is STL? Define a container, an iterator and an algorithm as they relate to the STL.

5. a) What is a stream? Write stream classes hierarchy for console I/O operations. 2 CO1 R
Or
What is manipulator? Formulate the differences between manipulators and ios member functions.
- b) Write a program that implements the following ios functions: 4 CO3 U
width(), precision(), fill(), setf()
Write the output of the program.
- c) Design a program to write the following information to a file called WhoAreYou.txt : 4 CO3 App
Name: xxxxxxx
Semester: Spring 2022
Course Code: CSE-1221
Course Title: Computer Programming 2

International Islamic University Chittagong

Department of Computer Science and Engineering

B.Sc. in CSE, Final Examination, Spring 2022

Course Code: EEE-1221

Course Title: Electronics

Time: 2 hours 30 minutes

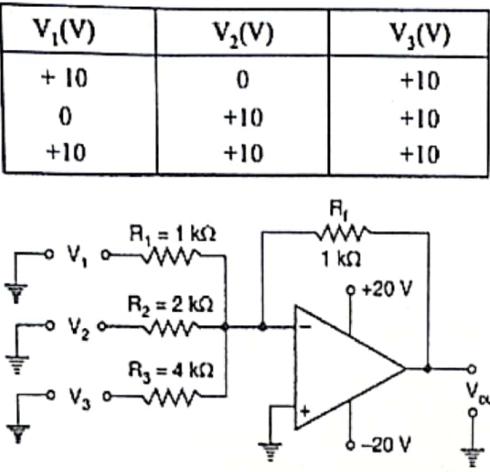
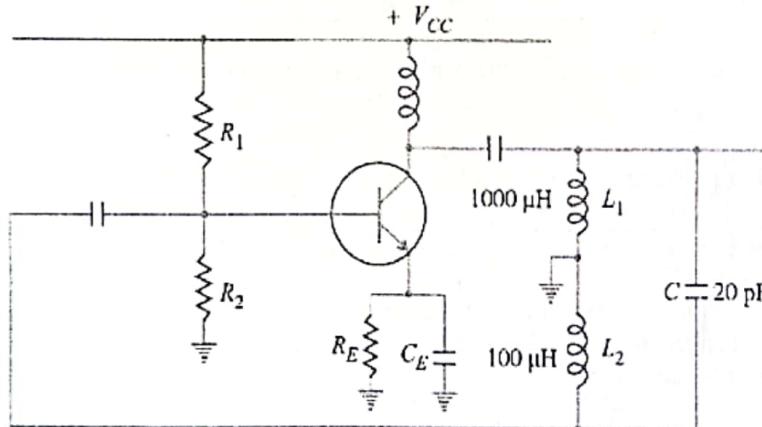
Full Marks: 50

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

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

Part A [Answer all the questions from the followings]					
1.	a)	<p>Write down the difference between JFET and BJT. Describe its construction and working principle of (N-Channel JFET).</p> <p>i) When gate-source voltage (V_{GS}) is applied and drain-source voltage is zero i.e. $V_{DS} = 0V$.</p> <p>ii) When drain-source voltage (V_{DS}) is applied at constant gate-source voltage (V_{GS})</p>	CO4	U	7
		Or,			
		<p>What is MOSFET? What are the different types of MOSFET? With a neat diagram, explain the working principle of an n-channel enhancement type MOSFET.</p>			
1.	b)	<p>A JFET has the following parameters: $I_{DSS} = 32 \text{ mA}$; $V_{GS(\text{off})} = -8V$; $V_{GS} = -4.5 \text{ V}$. Find out the value of drain current.</p>	CO4	A	3
2.	a)	<p>What is a multivibrator? Mention different types of multivibrators with proper waveshapes. With neat diagrams, explain the working of an astable multivibrator.</p> <p>Or,</p> <p>What is an oscillator? What are the essentials of an oscillator? With the help of a neat diagram, describe the circuit operation of a Hartley oscillator.</p>	CO4	U	5
2.	b)	<p>Fig. 2(b) shows the transistor switching circuit. Given that $R_B = 2.7 \text{ k}\Omega$, $V_{BB} = 2\text{V}$, $V_{BE} = 0.7\text{V}$ and $V_{knee} = 0.7\text{V}$.</p> <p>i) Calculate the minimum value of β for saturation.</p> <p>ii) If V_{BB} is changed to 1V and transistor has minimum $\beta = 50$, will the transistor be saturated.</p>	CO4	A	5
		Fig. 2(b)			

Part B
[Answer the questions from the followings]

3.	a)	Show that when the gain of summing amplifier is unity, the output voltage is the algebraic sum of the input voltages with proper circuit diagram. Or, Show that the output is the integral of the input with an inversion and scale multiplier of $1/RC$.	CO5	A	6												
3.	b)	Determine the output voltage from the circuit shown in Fig. 3(b) for each of the following input combinations:	CO5	A	4												
		<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>$V_1(V)$</th> <th>$V_2(V)$</th> <th>$V_3(V)$</th> </tr> </thead> <tbody> <tr> <td>+10</td> <td>0</td> <td>+10</td> </tr> <tr> <td>0</td> <td>+10</td> <td>+10</td> </tr> <tr> <td>+10</td> <td>+10</td> <td>+10</td> </tr> </tbody> </table> 	$V_1(V)$	$V_2(V)$	$V_3(V)$	+10	0	+10	0	+10	+10	+10	+10	+10			
$V_1(V)$	$V_2(V)$	$V_3(V)$															
+10	0	+10															
0	+10	+10															
+10	+10	+10															
		Fig. 3(b)															
4.	a)	What is negative feedback? Show that the input impedance of an amplifier increases due to negative feed.	CO5	U	6												
4.	b)	Calculate the operating frequency and feedback fraction of the following oscillator where the mutual inductance between two coils is $20\mu\text{H}$.	CO5	A	4												
																	
5.	a)	What is negative feedback?. Show that the input impedance of an amplifier increases due to negative feed.	CO5	U	5												
5.	b)	Write short on : i) Precision Rectifiers ii) Comparators Or,	CO5	U	5												
		What is an operational amplifier? Draw the circuit diagram of non-inverting OP-AMP with indicating different terminals. Also show the voltage gain of a non-inverting amplifier is $1 + \frac{R_f}{R_i}$															

5(a) Why negative is used in amps, derive the principle and gain of negative feedback.



International Islamic University Chittagong
Department of Computer Science & Engineering
B.Sc. in CSE Semester Final Examination, Spring -2022
Course Code: CSE-1223 Course Title: Discrete Mathematics

Time: 2 Hours 30 minutes

Full Marks: 50

Course Outcomes (COs) of the Questions						
CO1	Understand fundamental concept of different discrete structures and logical arguments.					
CO2	Analyze mathematical proofs to solve problems.					
CO3	Apply the knowledge into application such as in problem solving and designing.					

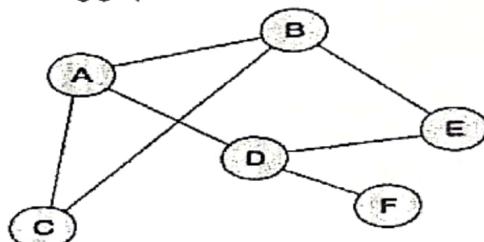
Bloom's Levels of the Questions						
Letter Symbols	R	U	App	An	E	C
Meaning	Remember	Understand	Apply	Analyze	Evaluate	Create

Group -A
Answer the following questions

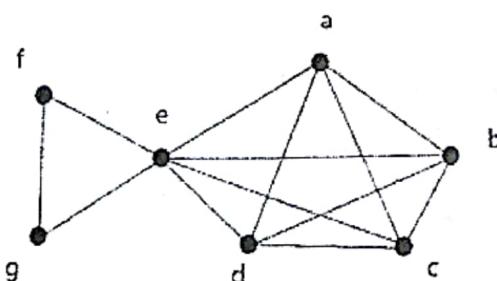
1. a) Define Linear Congruence. What are the solutions of the linear congruence $3x \equiv 4 \pmod{7}$ 3 CO2 U
- b) Find the GCD of 111 and 201 using Euclidian algorithm. 2 CO2 App
- c) What do you know pseudorandom number? Find the sequence of 8 pseudorandom number by choosing $m=17$, $a=5$, $c=2$ and $x_0=3$. 3 CO2 APP
Or
Find the smallest positive integer x such that
 $x \equiv 1 \pmod{5}$
 $x \equiv 2 \pmod{7}$
 $x \equiv 3 \pmod{9}$
 $x \equiv 4 \pmod{11}$
- d) Prove, for all integer $n \geq 4$, $2^n < n!$ 2 CO1 R
2. a) Write the 1st and 2nd principle of mathematical induction. Why mathematical induction is valid? 3 CO1 R
- b) Use mathematical induction to prove that $n^3 - n$ is divisible by 3 whenever n is a positive integer. 3 CO3 App
Or
Use mathematical induction to prove that the sum of the first n positive odd integers is n^2 .
- c) Explain Chinese Remainder Theorem with example. 4 CO2 U
Or
Show that if n is an integer greater than 1, then n can be written as the product of primes

Group -B
Answer the following questions

3. a) What do you about principles of counting? Discuss sum rule and product rule with an example. 2 CO1 R
- b) In how many ways Computer Club containing 50 members elect a General secretary, assistant General secretary and an executive(assuming no person is elected to more than one position) 3 CO2 U
- Or*
 Suppose a license plate containing three letters followed by two digits with the last digit not zero. How many different license plates can be printed?
- c) Describe Inclusion-Exclusion principle with an example. 2 CO2 U
- d) State the pigeonhole principle. Explain how pigeonhole principle can be used to show that among any 11 integers, at least two must have the same remainder when divided by 10. 3 CO2 U
4. a) Define with example: i) simple graph and ii) bipartite graph. 2 CO1 R
- b) State the Handshaking theorem of graph. Verify this theorem for the following graph. 2 CO2 U

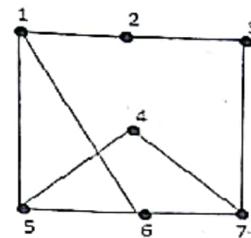
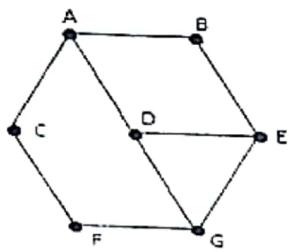


- c) Find the Euler path and circuit of the following graph 3 CO3 App



Or

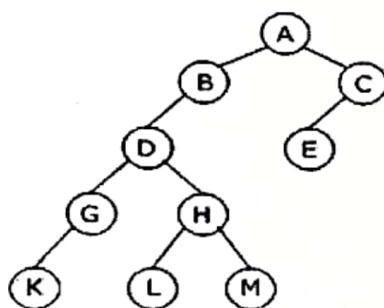
What do you mean by isomorphism of graphs? Determine whether the given pair of graphs in the following figure is isomorphic.



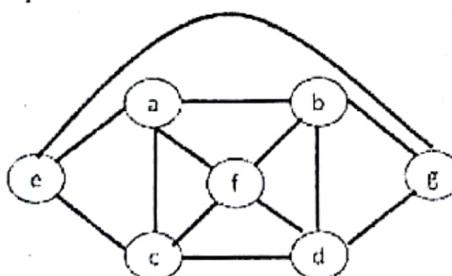
- d) What do you mean by Incidence Matrices? Draw the graph by the 3 CO2 U following Incidence Matrices.

$$\begin{bmatrix} 1 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 1 & 0 & 1 \\ 0 & 0 & 0 & 0 & 1 & 1 \\ 1 & 0 & 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 1 & 1 & 0 \end{bmatrix}$$

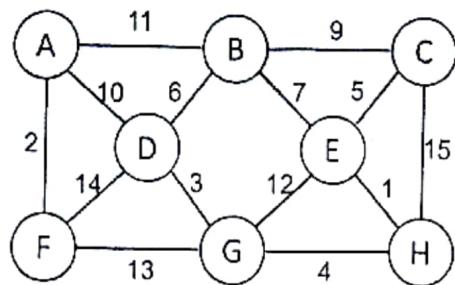
- 5 a) What do you mean by tree traversing? Find the inorder, preorder and 3 CO3 App postorder traversal of the following tree



- b) What is graph coloring? Use graph coloring algorithm on the following 3 CO3 App graph

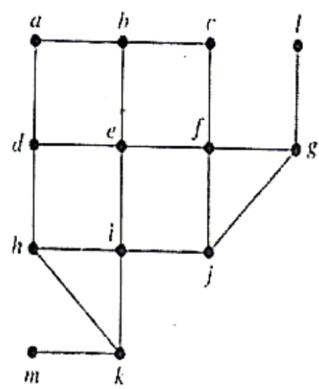


- c) Define spanning tree. Find the minimum spanning tree of the following 4 CO3 App graph



Or

Use breadth-first search to find a spanning tree for the following graph.



**International Islamic University Chittagong
Center for General Education (CGED)
Final Examination, Spring-2022**

Course Code: URED-1201

**Course Title: Basic Principles of Islam.
(Aqidah+Ibadah)**

Full Marks: 50

Time: 2 Hours 30 Minutes

*Answer any Five of the following questions.
(All questions are of equal value):*

1. "Sometimes the term 'Ibadah' is misunderstood and misused in our society"- justify this statement explaining the true meaning and different types of 'Ibadah from the viewpoint of Islam.
2. "*I created not Jinn and mankind except that they should worship me*"- explain this Ayah mentioning the objectives of 'Ibadah elaborately.
3. Summarize some important characteristics of 'Ibadah according to the statement of Muslim scholars.
4. Explain some widespread impacts of *Salah* on human life individually and collectively.
5. "*Zakah* is the best way to alleviate the poverty from society and establish an interest-free world"- evaluate this statement mentioning the definition of Zakah properly.
6. Define *Sawm* literally and terminologically. Explain the importance of *Sawm* in Islamic *Shari'ah*.
7. "*Take the method of Hajj from me*"- explain this Hadith mentioning some essential works of *Hajj* and their impact on our present life.

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International Islamic University Chittagong
Morality Development Program (MDP)
Final Examination, Spring-2022
2nd Semester (for Muslim Students only, other than Shari'ah Department)
Course Title: Tajweedul Qur'an-II Course Code: MDP-1202
Full Marks: 50

Time: 2 hours

Answer any Five (05) of the following questions

$5 \times 5 = 10$

1. Write the meaning of following Surahs.
 - a) Surah al Humazah (سورة الهمزة)
 - b) Surah at Takathur (سورة التكاثر)
2. Write the system of performing 2(two) rakat salah 10
3. Explain the impact of salat (Prayer) in human life. 10
4. Explain how to perform of salat al witr (صلوة العودة)? 10
5. Write a short note on salat times including first & last time. 10
6. Write the meaning of Tasahud (At-Tahiyyat). 10
7. Describe the teaching of the last two verses of surah Al -Baqarah (Q 2: 285 - 286) 10

International Islamic University Chittagong

Department of Computer Science and Engineering

B. Sc. in CSE

Final Exam, Spring 2022

Course Code: **PHY 1201**

Course Title: **Physics-II**

Time: 2 hours 30 minutes

Full Marks: 50

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

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

Part A

[Answer the questions from the followings]

1. a) Distinction between metal, insulator and semiconductor in terms of energy band diagram. CO1 U 5

Or,

1. a) Define: i) Lattice ii) Basis iii) Crystal iv) Unit Cell v) Crystalline Solid CO1 R 5

1. b) Show that the packing fraction for a fcc lattice is ~ 0.74 and hence write the meaning of this number. CO2 A 5

2. a) Define Miller indices and draw the plane of (100), (010), (101) and (111). CO1 U 5

2. 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. CO2 A 5

Or,

2. b) If a plane of a cubic lattice intersects the X, Y and Z axes at 3, 2 and 2 respectively. If lattice parameter (X+1) and find the distance of the plane from origin and draw this plane. Here X is the last digit of your student ID. CO2 E 5

Part B

[Answer the questions from the followings]

- | | | | |
|---|-----|---|---|
| 3. a) Explain "A moving clock always appears to go slow". | CO2 | A | 6 |
| 3. b) 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. | CO2 | A | 4 |
| 4. a) State the laws of radioactive disintegration. Show that, the number of radioactive atoms decreases exponentially with time. | CO2 | A | 5 |
| 4. b) The half-life of a radioactive substance is 30 days. Calculate (i) the radioactive decay constant, (ii) the mean life and (iii) the time taken for (1/8) of the original number of atoms to remain unchanged. | CO2 | E | 5 |
| 5. a) Define 'Nuclear Fission' and 'Nuclear Fusion' with an example of each. | CO1 | A | 4 |
| 5. b) Find the nuclear Mass, Size, density, binding energy and binding energy per nucleon for $_{88}^{226}\text{Ra}$. | CO2 | A | 6 |
- Or,
- | | | | |
|---|-----|---|---|
| 5. a) Write short note on:
(i) Photoelectric effect
(ii) Compton effect | CO1 | R | 4 |
| 5. b) Show that, the mean life of a radioactive atom is the reciprocal of the radioactive constant. | CO2 | R | 6 |



International Islamic University Chittagong (IIUC)
Department of Computer Science and Engineering (CSE)
B. Sc. in CSE, Semester Final Examination, Spring-2022
Course Code: MATH-1207, Course Title: Mathematics-II

Time: 2:30 hours

Marks: 50

Answer all questions. Figures in the right margin indicates full marks

Bloom's Levels of the Questions

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

Group - A

Answer the following questions

- | | | |
|----|--|-----------------------|
| 1. | a) Define order and degree of a differential equation with example | Marks CO DL |
| | | 1 CO2 C1 |
| b) | Solve the differential equation $\frac{dy}{dx} = \sin(x+y) + \cos(x+y)$ | 4 CO2 C2 |
| | Or | |
| a) | Define homogeneous function with example | 1 CO2 C1 |
| b) | Solve the differential equation $(2x - 2y + 5) \frac{dy}{dx} = (x - y + 3)$ | 4 CO2 C2 |
| c) | Define integrating factor | 1 CO2 C1 |
| d) | Test whether the differential equation,
$(x^2 + y^2) dx - 2xy dy = 0$ is exact or not. If not then make it exact | 4 CO2 C3 |
| 2. | a) State Bernoulli's differential equation | 1 CO2 C1 |
| b) | Solve the Bernoulli's differential equation, $\frac{dy}{dx} + xy = x^3 y^3$ | 4 CO2 C2 |
| c) | Solve the differential equation
$\frac{dx}{dy} (x^2 y^3 + xy) = 1$ | 5 CO2 C2 |
| | Or | |
| c) | Solve the linear differential equation with constant coefficients
$\frac{d^3 y}{dx^3} - \frac{dy}{dx} = e^{-x} + \cos 2x$ | 5 CO2 C2 |

Group - B
Answer the following questions

3. a) Define Bessel's function. 1 CO2 C1
 b) Show that, $\sqrt{\left(\frac{1}{2}\pi x\right)} J_{-\frac{1}{2}}(x) = -\sin x - \frac{\cos x}{x}$. 4 CO2 C2
 c) Define Legendre's Polynomial for first kind. State and prove the Orthogonality condition of Legendre's Polynomials. 5 CO2 C2
Or
 c) Solve the linear differential equation by the method of Undetermined Coefficients, $(D^2 + 2)y = e^x + 2$ 5 CO2 C2
4. a) Solve the linear partial differential equations by Lagrange's method, $(y^2 + z^2 - x^2)p - 2xyq + 2xz = 0$ 5 CO2 C3
Or
 a) Solve the following linear partial differential equation by Lagrange's method: $(z^2 - 2yz - y^2)p + (xy + xz)q = xy - xz$ 5 CO2 C3
 b) Solve the non-linear partial differential equations by Charpit's method, $px + qy = pq$ 5 CO2 C3
5. a) Solve the linear partial differential equation $(r - 6s + 9t)z = 12x^2 + 36xy$. 5 CO3 C2
 b) *Kulkula* and *Gulgula* are close friends. One day *Kulkula* went to *Gulgula's* house to collect class lectures on MATH-1005 due to his absence from the Math class. *Gulgula* made a warm welcome by baking a cake for his friend *Kulkula*. When the cake is removed from the oven, its temperature is measured at 300°F. After 3 minutes its temperature is 200°F. Form a differential equation and find how long will it take to cool off to a room temperature of 70°F. 5 CO3 C3