2. Consider the following truth table representing the behavior of a 3-input logic circuit:

A	B	C	Output
0	0	0	1
0	0	1	0
0	1	0	1
0	1	1	1
1	0	0	0
1	0	1	0
1	1	0	1
1	1	1	0

Design the logic circuit using basic logic gates (AND, OR, NOT) based on the given truth table. Clearly indicate the connections and label the gates appropriately.

ISC-S 101

MID SEMESTER EXAMINATION -1

University Institute of Engineering & Technology
C. S. J. M. University Kanpur
for CSE (AI) and MEE Students Only

Max Marks: 30 **Max Time: 90 Mins.**

Note: Answer all questions of a section at same place.

Section A
(1 Marks Each)

1. Add the hexadecimal numbers *A3* and *2F*.

2. If a JPEG image is 5.5 MB in size, how many bytes is it equivalent to?

3. What does *ASCII* stand for?

4. Which of following is/are definitely not a binary number:

a. *101010000000101* ***c.*** *101010170001001*
b. *101010A00001001* ***d.*** *101010110000101*

5. For a 15-input logic circuit, how many rows would its truth table have?

6. What is the primary function of an operating system?

7. Describe the purpose of a motherboard.

8. Name any three activities for which computers can be used in medicine.

9. Give name of four input devices.

Section B
(3 Marks Each)

1. Five friends - Akshay, Bhavana, Chetan, Deepika, and Esha - are working on different

computer science projects. Each friend has a unique role: Programmer, Database Administrator, Network Engineer, Web Developer, and Artificial Intelligence Specialist. They also have different preferences for programming languages: Python, Java, C++, JavaScript, and Ruby. Determine each friend's role and preferred programming language using the given clues:

a. Esha, who is not the Database Administrator, prefers Python.

b. The Network Engineer works with Java and is not Chetan or Akshay.

c. Bhavana loves Ruby and is the Web Developer.

d. Akshay is the Artificial Intelligence Specialist and doesn't use C++.

e. The Programmer uses JavaScript.

Determine the role and preferred programming language for each friend.

2. Which basic logic gates are used in the construction of a Carry Ripple Adder? Show it through the diagram.

3. In an effort to promote sustainable energy practices in India, a team of engineers is designing a logic circuit to control the lighting system for a traditional Indian festival. The lighting system has three sources: LED bulbs, CFL bulbs, and traditional incandescent bulbs. The circuit should follow the following rules:

For Students of Branch CSE (AI) and MEE Only

- If the LED bulbs are on, the CFL bulbs must be off.
- If the CFL bulbs are on, the traditional incandescent bulbs must be off.
- At least one type of bulb must always be on during the festival.

Design a logic circuit using basic gates (AND, OR, NOT) to implement the control system for the lighting during the festival. Represent the circuit diagrammatically, label the gates appropriately, and explain how the circuit ensures compliance with the given rules.

Section C
(6 Marks Each)

1. In the spirit of Indian numerals and their historical significance, a group of students is using different number systems to represent quantities. Each student has a unique number represented in a specific number system. Determine the decimal equivalent of each student's represented number based on the given information:

a. Arjun's represented number is in the Binary system and is 1101.

b. Bhavya's represented number is in the Octal system and is 345.

c. Chetna's represented number is in the Hexadecimal system and is 1A2.

d. Deepak's represented number is in the Decimal system and is 1947.

e. Esha's represented number is in the Ternary system and is 102.

Calculate the decimal equivalent for each student's represented number.

DEPARTMENT OF PHYSICS (CSEAI)

UNIVERSITY INSTITUTE OF ENGINEERING AND TECHNOLOGY, CSJM UNIVERSITY, KANPUR

Physics-II (PHY-S102)

Semester:2023-24(Even Semester). **Year: Ist Year(2K23)**

1st Mid Semester Examination

Time:1.5 h **Maximum mark:20**

All questions are compulsory

Section A

Each question has 01 mark.

1. The Curl of the gradient of Scalar Function is_____.
2. The divergence of the curl of a vector function is_____.
3. The electric field inside a perfectly conducting media is_____.
4. Surface integral change into volume integral by _____theorem.
5. When a test charge is brought from infinity to field along the perpendicular bisector of dipole, the work done is _____.
6. The work done on a unit positive charge in bringing it from infinity to any point is called_____.

Section B

Each question have 02 marks.

7. Find the ratio of electrical force to gravitational force between proton and electron. Given: $m_p=1.67\times10^{-27}$kg, $m_e=9.1\times10^{-31}$C, $q_e=1.6\times10^{-19}$kg, $G=6.67\times10^{-11}$N- m^2/kg^2, $1/4\pi\varepsilon_0=9\times10^9 Nm^2/C^2$.
8. The potential function at a point is given by $V = x(3y^2 - x^2 + z)$. Find the components of the electrostatic field at that point.
9. Find the potential at the centre of a square ABCD with charges of $+10^{-9}$C, -4×10^{-9}C, 3×10^{-9}C and $+4\times10^{-9}$C placed at the A, B, C, D corner of square. If the side of square are 2 metre.

Section C

Each question have 04 marks.

10. Derive the expression for the electric field E of a spherically symmetric uniform charged distribution applying Gauss's law-
    A. When r > R
    B. r < R
        a. If Sphere is conducting
        b. If Sphere is non-conducting.
11. A Spherically symmetric charge distribution of radius R is characterised by the charge density function- $\rho(r) = \rho_0 [1 - r^2/R^2]$..... for $r \leq R$
    $= 0$.....for $r > R$
    A. Calculate total amount of charge
    B. The electric field strength at a point distant r from centre inside and outside the charge distribution.
    C. The value of r from which the field is maximum.

Department of Humanities
U. I. E. T., C. J. M. University
Professional Communication (HSS-S 101), Branch: CS (AI)
Semester: 2024 (Even Sem.) **Year: 1st Year (2K23)**
First Mid Semester Examination
Time: 1.5h **Total Marks: 30**

Section A

Q1. Fill in the correct form of the word in the following sentences: **(1x9=9)**

a. In the _____ form, the _____should provide the specific details to apply. (apply)
b. The _____went on strike because of the _____ misconduct. (employ)
c. Due to the _____ details, the judge considered the evidence weak and _____ ___(sufficient, valid)
d. Freedom of media is necessary to provide _____and _____news to the masses. (bias, inform)
e. Women should be self-reliant to _____from the shackles of _____ (break, patriarch)
f. The company _____a few workers, however the difficult decision_____ _____. (lay off, to keep the ball rolling)

Rearrange the following jumbled sentences into meaningful sentences:

g. of the masses /is/ Education/ for/ the empowerment / at the grassroots level/necessary.
h. put into effect/will not/ meet/ the company/ if/ the stringent/ the sales target/ are not / strategies
i. short/take/to/i/her/walks/the park/for

Section B

2. Attempt **any three** of the following: **(3x3=9)**

i. Read carefully the given Situation :
Manager: Why have you not submitted the first quarter Sales Report 2024?
Employee: Sir, I was over-busy with Mr.Taneja's pending entry who is on leave, but somehow I managed to submit the quarterly Sales Reports for 2023.
From the above-given situation, answer the following:
a. Identify the barrier and its problems b. State the words that point out the barrier.
c State the solution to overcome the barrier.

ii. How does the "know-it-all attitude" affect communication?
iii. How do the "blocked-categories" affect communication?
iv. What are the features of technical communication? Revise the following sentences into technical sentences:
   a. Student: I am completed graduation last year. I were methodical in my practical classes and understood each experiment well.
   b. Manager: I request you all to come to the meeting on time tomorrow.
   c. Subordinate: I will not come tomorrow. Give me the leave for tomorrow.

Section C

3. Attempt **any two** of the following: **(2x6=12)**

1. Define communication. Write a short note on the three components of the communication system.
2. Discuss in detail the features of the upward flow of communication.
3. Write a short note on the types of barriers that arise in an organisation.

Total nos. of printed pages: 02

Roll No: CSJMA.2300 1390

Department of Mathematics
CSJM University, Kanpur
Mathematics-II (MTH-S102)
Branch- CSE(AI)
Semester 2nd: 2023-24 (Even Semester)
1st Mid Semester Examination

Time: 1.5 Hrs. **M.M: 30**

Section A

1. Attempt **all** questions $(1 \times 9 = 9)$

a. For which value of 'b' the rank of the matrix $A = \begin{bmatrix} 1 & 5 & 4 \\ 0 & 3 & 2 \\ b & 13 & 10 \end{bmatrix}$ is 2?

b. If A is a Hermitian matrix, then show that iA is a skew-Hermitian matrix.

c. Show that the matrix $\begin{bmatrix} cos\theta & sin\theta \\ -sin\theta & cos\theta \end{bmatrix}$ is orthogonal.

d. If A and B are square matrices, then show that $AB' - BA'$ is a skew-symmetric matrix.

e. Let $A = [a_{ij}]_{m\times n}$ be a matrix such that $a_{ij} = 1$ for all i, j. Then rank A is …

f. Every diagonal element of skew-symmetric matrix is …

g. A square matrix A is said to be unitary if ……

h. Show that Q(R) is not a vector space.

i. Find all the solutions of the following system of linear equations: $4x + 6y = 0$ and $-2x - 3y = 0$.

Section B

2. Attempt **all** questions $(3 \times 3 = 9)$

a. Find the inverse of the matrix $\begin{bmatrix} 1 & 3 & 3 \\ 1 & 3 & 4 \\ 1 & 4 & 3 \end{bmatrix}$ by using elementary row or column transformations

b. Show that the matrix $B^{\theta}AB$ is Hermitian or Skew-Hermitian according as A is Hermitian or Skew-Hermitian.

c. Find the ranks of the matrix $\begin{bmatrix} 5 & 3 & 14 & 4 \\ 0 & 1 & 2 & 1 \\ 1 & -1 & 2 & 0 \end{bmatrix}$.

Section C

3. Attempt **all** questions $(2 \times 6 = 12)$

(a). Investigate for what values of λ and μ the equations $x + y + z = 6$, $x + 2y + 4z = 10$, $2x + 3y + \lambda z = \mu$ have (i) no solution, (ii) a unique solution, and (iii) infinitely many solutions.

(b). Show that, set of real numbers is a vector space over the field of rational number.