Mid-term Examination
Subject: XYZ
Class: 12
Time: 3 Hours

Instructor: Your Name

November 30, 2024

Instructions:

- The exam consists of 5 sections.
- Answer all questions in each section.
- Use separate sheets for rough work.
- Total marks: 100.

Section 1: Multiple Choice Questions (20 marks)

Answer all questions. Each question carries 1 mark.

1. Which of the following is the correct formula for calculating the area of a circle?
   (a) $A = 2\pi r$
   (b) $A = \pi r^2$
   (c) $A = \frac{1}{2}\pi r^2$
   (d) $A = \pi d^2$

2. Which data structure follows the First-In-First-Out (FIFO) principle?
   (a) Stack
   (b) Queue
   (c) Array
   (d) Tree

3. What is the value of $\int_0^1 x^2\,dx$?
   (a) $\frac{1}{3}$
   (b) $\frac{1}{2}$

(c) 1

(d) 0

Section 2: Short Answer Questions (30 marks)

Answer all questions. Each question carries 5 marks.

1. Describe the difference between RAM and ROM.
2. Explain the working of a binary search algorithm.
3. Define and give an example of a recursive function.
4. Differentiate between TCP and UDP.
5. Explain the laws of thermodynamics briefly.

Section 3: Long Answer Questions (30 marks)

Answer any 3 questions. Each question carries 10 marks.

1. Describe the architecture of the OSI model in detail.
2. Solve the differential equation: $\frac{dy}{dx} + 2xy = 0$.
3. Discuss the impact of Artificial Intelligence on modern industries.
4. Write an essay on the ethical considerations of data privacy.

Section 4: Numerical Problems (20 marks)

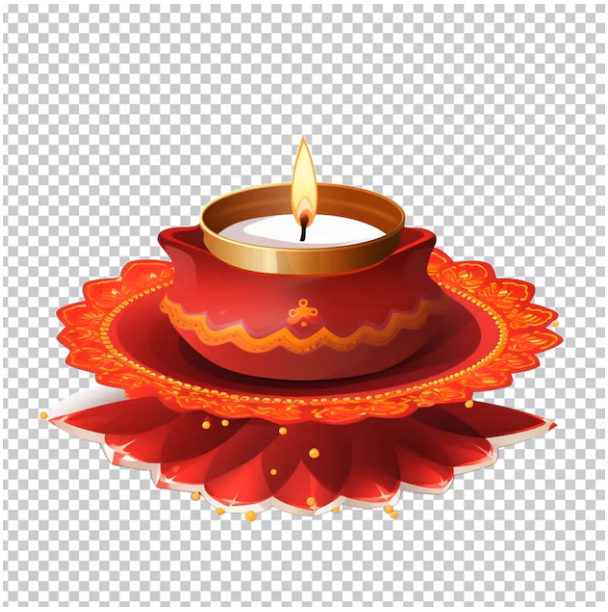
Solve any 2 problems. Each problem carries 10 marks.

1. Find the area under the curve for $f(x) = x^3$ between $x = 0$ and $x = 2$.
2. A car accelerates from rest with an acceleration of 3 m/s^2. How far does it travel in 10 seconds?
3. Solve for x in the quadratic equation $x^2 - 5x + 6 = 0$.

Section 5: Diagram-based Questions (Optional)

Answer the following questions based on the diagram provided.

1. Label the parts of the neuron structure in the diagram below and explain their functions.



2. Identify the components of the circuit diagram provided below.