IIITH UGEE 2025 Question Paper

Time Allowed :1 Hour	**Maximum Marks :**100	**Total Questions :**50

General Instructions

Read the following instructions very carefully and strictly follow them:

1. The Duration of test is 1 Hour.
2. This paper consists of 50 Questions.
3. The test includes Physics, Chemistry and Mathematics (PCM) questions.
4. There will be 50 questions in total from the subject proficiency test section with English as the medium of instruction/ paper.
5. The test has 25 percent negative marking which means 0.25 mark will be deducted for each wrong answer and 2 marks will be rewarded for each correct answer.

1. Explain the difference between work and energy. Give an example where work is done on an object, but its kinetic energy does not change.

(A) Work is done only when a force moves an object, while energy is the capacity to do work.

(B) Work and energy are the same.

(C) Work does not involve force, while energy involves force.

(D) Energy is a type of work done on an object.

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2. A block of mass 2 kg is placed on a rough inclined plane at an angle of 30 degrees. The coefficient of friction between the block and the plane is 0.2. If the block is released from rest, will it slide down the plane? Justify your answer with calculations.

(A) Yes, it will slide down.

(B) No, it will not slide down.

(C) It will slide down after some time.

(D) Cannot be determined.

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3. A graph shows the velocity of an object as a function of time. Describe the motion of the object in detail, including its acceleration and displacement, at different points in time. What does the area under the curve represent?

(A) Acceleration is constant, and displacement is calculated using the area.

(B) Acceleration is variable, and displacement is zero.

(C) The velocity graph gives the displacement and acceleration directly.

(D) The area under the curve gives velocity, while the slope gives displacement.

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4. Explain the difference between a strong acid and a weak acid. How does the pH of a solution change when a strong acid is added compared to a weak acid?

(A) A strong acid dissociates completely, while a weak acid only partially dissociates.

(B) Strong acids have higher pH than weak acids.

(C) Weak acids produce fewer hydronium ions than strong acids.

(D) Both A and C are correct.

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5. You are given 100 mL of a 0.1 M solution of HCl and 200 mL of a 0.2 M solution of NaOH. Calculate the pH of the resulting solution after mixing the two solutions.

(A) pH = 7

(B) pH = 9

(C) pH = 10

(D) pH = 11

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6. You are given a set of experimental data for a chemical reaction, including the concentrations of reactants and products at different times. Determine the order of the reaction and the rate constant.

(A) First order, rate constant = 0.5

(B) Second order, rate constant = 1.2

(C) First order, rate constant = 1.5

(D) Zero order, rate constant = 0.8

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7. Explain the concept of a limit. Why is it important in calculus?

(A) A limit is the value a function approaches as the input approaches a particular point. It is essential in calculus for defining derivatives and integrals.

(B) A limit is the point where a function reaches its maximum value.

(C) A limit is used to find the solution of algebraic equations.

(D) A limit is not relevant to calculus.

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8. Find the equation of the tangent line to the curve $y = x^2 - 3x + 2$ at the point $(1, 0)$.

(A) $y = 2x - 2$

(B) $y = 3x - 3$

(C) $y = x - 2$

(D) $y = 2x$

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9. You are given a sequence of numbers: 2, 5, 10, 17, ... Identify the pattern and find the next three terms in the sequence. Can you express the nth term of this sequence in a

general formula?

(A) 26, 37, 50, $n^2 + 1$

(B) 26, 41, 58, $n^2 + 1$

(C) 26, 39, 54, $n^2 + 1$

(D) 27, 42, 59, $n^2 + 1$
