

# 2021 IUT Admission Test(SOCIE Scholarship)

## Physics Examination (Sample)

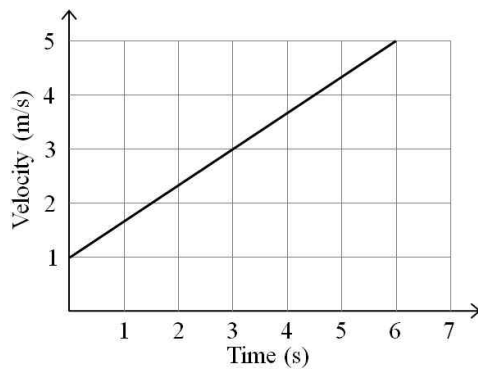
**<Essay Types>** Applicants should write detailed solving process. If there is no solution, you will receive 0 points regardless of the correct answer.

- The point for each question is indicated next to each question number.
- Be sure to use SI units (the international system of units) for all physical quantities.



1. [10 points]

Following figure gives the velocity of a particle moving on an  $x$  axis. Determine the acceleration of the particle.



2. [10 points]

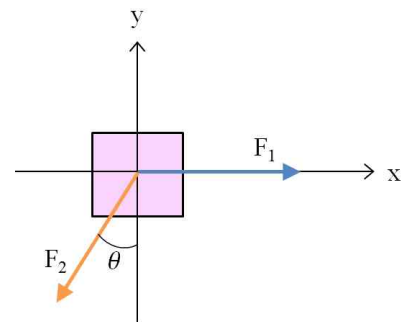
The current flowing through a resistor is 2 A when the applied voltage across the resistor is 100 V. How much power will be dissipated as heat if the applied voltage across the resistor is increased to 200 V?

3. [10 points]

A light with the frequency of  $2.0 \times 10^{15}$  Hz is incident on a metal. What is the kinetic energy of the electron emitted from the metal if the work function of the metal is 5.0 eV? (Assume that the Plank constant  $h$  is  $4.1 \times 10^{-15}$  eV·s.)

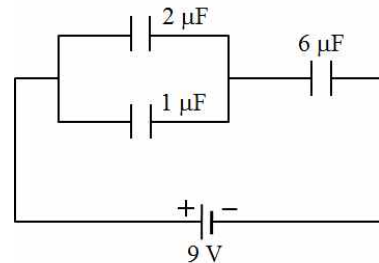
4. [20 points]

Two forces are exerted on a 2-kg box as shown in the following figure. When the magnitudes of forces are  $F_1 = F_2 = 10$  N and the angle  $\theta$  in the figure is  $30^\circ$ , find the magnitude of acceleration of the box.



5. [20 points]

Three capacitors are arranged in a circuit as shown below. What is the voltage across the  $6\text{-}\mu\text{F}$  capacitor?



6. [30 points]

A wood block of mass  $M = 5.0$  kg is hanging from a long cord. A bullet of mass  $m = 0.10$  kg is fired with an initial speed  $v = 51$  m/s into the block. The bullet embeds in the wood block, and then they swing upward together. The wood block rises a vertical distance  $H$  before the pendulum comes momentarily to rest. Find the vertical distance  $H$ . (Assume the magnitude of gravitational acceleration is  $g = 10$  m/s<sup>2</sup>)

