

المستوى الاول  
الفترة الخامسة  
العدد ٤٤ / ١٤١٧ / ٢٠١٧  
فيزياء

Kafrelsheikh University  
Faculty of Science  
Physics Department  
First level  
First Term 2017/2018



Time: 2<sup>nd</sup> h  
Subject: Heat & Properties  
of Matter  
Mark: 70 Marks  
Date: 24 /12/2017

**Answer the following questions:**

1. (a) Define: heat, Heat capacity (C), Thermal expansion, and heat transfer by convection (12 Marks)  
(b) Discuss the conduction of heat transfer through a composite slab? (9 Marks)
2. (a) Write short notes about: measuring the specific heat capacities of solid by method of mixtures? (8 Marks)  
(b) A Styrofoam cooler has total wall area of  $0.80 \text{ m}^2$  and wall thickness  $2.0 \text{ cm}$ . It is filled with ice, water, and cans of Omni-Cola, all at  $0^\circ\text{C}$ . What is the rate of heat flow into the cooler if the temperature of the outside wall is  $30^\circ\text{C}$ ? How much ice melts in 3 hours?  $k = 0.027 \text{ W/m}\cdot\text{K}$ ,  $L_f$  is  $3.34 \times 10^5 \text{ J/kg}$  (6 Marks)
3. (a) Which of the following equations are dimensionally correct?  
(i)  $v_f = v_i + ax$       (ii)  $y = (2m)\cos(kx)$  where  $k = 2\text{m}^{-1}$  (6 Marks)  
(b) Determine the value of the surface tension of a soap solution by forming a soap bubble? (5 Marks)
4. (a) Deduce Bernoulli's Equation (P & V) of dynamic fluid? (10 Marks)  
(b) Deduce the value of the central acceleration of a body rotate around a circle? (7 Marks)  
(c) A mass of  $160 \text{ gm}$  is attached to the end of a spiral spring whose force constant is  $10^{-2} \text{ N}\cdot\text{m}^{-1}$ . Find the maximum speed and the maximum acceleration if the spring is pulled  $4 \text{ Cm}$  along a horizontal frictionless table from its equilibrium position and then released? (7 Marks)

**\*\*End of Exam\*\***  
Best Wishes