



**MURANG'A UNIVERSITY COLLEGE**  
(A Constituent College of Jomo Kenyatta University of Agriculture and Technology)

**2014/2015 ACADEMIC YEAR**  
**FIRST YEAR EXAMINATION**

**FOR DIPLOMA**  
**IN**  
**MECHANICAL ENGINEERING**

**PHYSICS 11**  
**SUPPLEMENTARY EXAM**

**DATE: 4<sup>TH</sup> AUGUST 2015**

**TIME: 2HOURS**

**Answer all questions**

1. A 500g block is shot up the incline which makes an angle of  $25^\circ$  with the horizontal. If the initial speed of the block is 400cm/s. How far up the incline will it go if the coefficient of friction between it and the incline is 0.2? 6marks
2. Water flows through a fire hose of diameter 6.35 cm at a rate of  $0.012 \text{ m}^3/\text{s}$ . The fire hose ends in a nozzle of inner diameter 2.2 cm. What is the speed with which the water exits the nozzle? 4marks
3. For the system shown below, the slave cylinder of an hydraulic lift has a mass of 600kg and a cross sectional area of  $800\text{cm}^2$  while the master piston has a cross sectional area of  $25\text{cm}^2$  and negligible weight. If the apparatus is filled with oil of density  $0.78\text{g}/\text{cm}^3$ , find the force F required to hold the system in equilibrium. 4marks
4. A 10kg object is to be given an upward acceleration of  $0.2\text{m}/\text{s}^2$  by a rope pulling straight upwards on it. What must be the tension on the rope? Take  $g = 10\text{N}/\text{kg}$ . 3marks

5. State the three laws of dry friction. 3marks
6. A horizontal force of 200 N is needed to pull a 60kg box across the horizontal floor at a constant speed. What is the coefficient of friction between the floor and the box? Take  $g = 10\text{N/kg}$ . 4marks
7. A 400g block with an initial speed of 80cm/s slides along a horizontal table top against a friction force of 0.7N.
- a) How far will it slide before stopping? 4marks
- b) What is the coefficient of friction between the block and the table top? Take  $g = 10\text{N/kg}$ . 2marks
8. Define work and energy and state their SI units. 4marks
9. How much work is done against gravity to lift a 4kg object through a vertical height of 50cm? take  $g = 10\text{N/kg}$ . 3marks