



MURANG'A UNIVERSITY COLLEGE

(A Constituent College of Jomo Kenyatta University of Agriculture and Technology)
UNIVERSITY EXAMINATIONS 2014/2015 ACADEMIC YEAR
AUGUST 2015
FIRST YEAR EXAMINATION

FOR DIPLOMA
IN
MECHANICAL AND ELECTRICAL ENGINEERING

SEE 1108/ PAS 1104 - PHYSICS 1

DATE: 24TH AUGUST 2015

TIME: 2HOURS

Answer all questions

- 1) Determine whether the equation $s = ut + \frac{1}{2}at^2$ is dimensionally correct. 3marks
- 2) Define the following terms 4marks
 - i. velocity
 - ii. Speed
 - iii. Acceleration
 - iv. Centripetal force
- 3) State Newton's laws of motion. 3marks
- 4) A horizontal force of 2000N is applied to a vehicle of mass 400kg which is initially at rest on a horizontal surface. If the total force opposing motion is constant at 800N, calculate:
 - a) The acceleration of the vehicle 3marks
 - b) The kinetic energy of the vehicle 5 seconds after the force is applied 4marks
 - c) The total power developed 5 seconds after the force is applied 4marks
- 5) The bob of a simple pendulum moves simple harmonically with amplitude 4 cm and period 2 seconds. Its mass is 0.5 kg. calculate the maximum values of:
 - a) The speed of the bob 3marks
 - b) The kinetic energy of the bob 3marks
- 6) Define the following 3marks
 - a) Stress
 - b) Strain
 - c) Elasticity

- 7) An elastic string of cross-sectional area of 4mm^2 requires a force of 2.8N to increase its length by one tenth.
- Find Young's modulus for the string 3marks
 - If the original length of the string was 1m , find energy stored in the string it is so extended. 3marks
- 8) 0.02kg of ice and 0.1kg of water at 0°C are in a container. Steam at 100°C is passed in until all the ice is just melted. How much water is now in the container? Specific latent heat of steam = $2.3 \times 10^6\text{J/kg}$, specific latent heat of ice = $3.4 \times 10^5\text{J/kg}$, specific heat capacity of ice = 2100J/kgK and specific heat capacity of water is 4200J/kgK . 5marks
- 9) Define
- Ice point
 - Steam point
 - Triple point 3marks
- 10) A particular thermometer has a resistance of 40Ω at the ice point, 55.25Ω at the steam point and 46.38Ω when immersed in a boiling liquid. A constant volume gas thermometer gives readings $1.888 \times 10^5\text{Pa}$, $2.224 \times 10^5\text{Pa}$ and $2.02 \times 10^5\text{Pa}$ at the same three temperatures. Calculate the temperature at which the liquid is boiling
- On the scale of the resistance thermometer 3marks
 - On the scale of the gas thermometer 3marks
- 11) State the laws of refraction. 2marks
- 12) Briefly discuss dispersion of white light by a triangular prism. 10marks
- 13) State two conditions for total internal reflection. 2marks
- 14) A converging lens forms a real image of a real object. If the image is twice the size of the object and 90cm from it,
- calculate the focal length of the lens 3marks
 - how far from the lens would the object have to be placed for the image to be the same size as the object? 3marks