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University Examinations 2024/2025

FIRST YEAR THIRD SEMESTER EXAMINATION FOR THE DIPLOMA IN AGRICULTURE

AAD 2307: PHYSICS

DATE: DECEMBER 2024 **TIME: 1½ HOURS**

INSTRUCTIONS: *Answer question **one** and any other **two** questions*

QUESTION ONE (30 MARKS)

a) Define the following terms (5 marks)
b) Density
c) Relative density
d) Volume
e) Mass
f) Weight

b) Calculate the density of a glass block with mass 250 g, dimensions 10 cm by 5 cm by 2 cm in kg/m^3 (3 marks)

c) 100 cm^3 of fresh water of density 1,000 kgm^{-3} is mixed with 100 cm^3 of sea water of density 1030 kgm^{-3}. Calculate the density of the mixture. (4 marks)

d) An astronaut weighs 900 N on earth. On the moon he weighs 150 N. Calculate the moons' gravitational strength. (Take g = 10 N/kg). (3 marks)

e) Given acceleration has SI units of ms^2 and force has the dimension of mass multiplied by acceleration. What are the dimensions and SI units of force, expressed in terms of the base dimensions and units? (4 marks)

f) Giving an example of each case differentiate between magnetic and non-magnetic materials. (4 marks)

g) Explain how the following factors affect surface tension (2 marks)

h) (i) Impurities

(ii). Temperature

i) State any two real life examples where Newton's third law of motion is applied (2marks)

j) List three factors affecting the rate of heat conduction. (3 marks)

QUESTION TWO (15 MARKS)

a. Define heat capacity (2 marks)

b. A block of metal of mass 1.5 kg which is suitably insulated is heated from 30ºC to 50 ºC in 8 minutes and 20 seconds by an electric heater coil rated 54 watts. Find;

I. The quantity of heat supplied by the heater (3 marks)

Il. The heat capacity of the block (3 marks)

111. Its specific heat capacity (2 marks)

c. If 300 g of paraffin is heated with an immersion heater rated 40 W, what is the temperature after 3 minutes if the initial temperature was 20ºC? (S.H.C for paraffin - 2,200 J Kg^{-1} K^{-1}). (5 marks)

QUESTION THREE (15 MARKS)

a) List applications of the law of conservation of momentum (2 marks)

b) Discuss two types of collisions (3 marks)

c) A minibus of mass 1,500 kg travelling at a constant velocity of 72 km/h collides head-on with a stationary car of mass 900 kg. The impact takes 2 seconds before the two move together at a constant velocity for 20 seconds. Calculate

i. The common velocity (3 marks)

ii. The distance moved after the impact (2 marks)

iii. The impulsive force (3 marks)

iv. The change in kinetic energy (2 marks)

QUESTION FOUR (15MARKS)

a) The relative density of some type of wood is 0.8. find the density of the wood in kg/m^3 (3marks)

b) State any four properties of matter (3 marks)

c) Differentiate between mass and weight (4 marks)

d) State any two factors that affect surface tension (2marks)

e) i) Define pressure (1 mark)

ii) If a box exerts a force of 30N on a bench while covering an area of $20m^2$, calculate the pressure the box exerts on that bench (2marks)