THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

Faculty of Engineering and Technology

DEPARTMENT OF BUILDING AND CIVIL ENGINEERING

DCC 09A

DIPLOMA IN BUILDING AND CIVIL ENGINEERING 09A

CONSTRUCTION TECHNICIAN I 09A

PHYSICS I

SEMESTER 1 EXAMINATION APRIL/MAY 2010

TIME : 2 HOURS

Instructions

Answer question ONE is Compulsory and any TWO questions.

Question ONE

a) State the three phases of matter and differentiate between them interms of shape volume and kinetic energy of vibration of the molecules. (12marks)

b) State

i) Archimedes principle

ii) Law of flotation (2marks)

c) An object of weight W and density **δ** is fully immersed in a liquid of density **σ**. Use Archimedes principles to obtain expression of upthrust or weight of the liquid displaced. (6marks)

d) Use a cuboid to prove that volume expansivity ($\boldsymbol{\gamma}$)is equals to three times the value of linear exapansivity (α)
i.e. $\boldsymbol{\gamma} = 3\boldsymbol{\alpha}$. (10marks)

Question TWO

a) Obtain dimension units of Coefficient of viscosity. (8marks)

b) Calculate rate of flow of heat through a plaster ceiling which measures 6m x 4m x 15mm.

i) Without

ii) With a 15mm thick layer of insulating fibre-glass if the inside and outside surfaces are at the surrounding air temperatures of 20˚C and 5˚C respectively. Take Kplaster as $0.60 wm^{-1}{}^{\circ}C^{-1}$
K fibre glass as $0.04 wm^{-1}{}^{\circ}C^{-1}$ (12marks)

Question THREE

a) Define

i) Stress

ii) Strain (2marks)

b) i. Draw a simple graph to show the relationship

between stain and stress for a ductile material

ii. Explain the shape of your graph. (16marks)

c) A load of 2kg attached to end of a wire 4m long with a den of 0.24mm 17^{th} stretches by 2.0mm. Calculate young modules. E. (2marks)

Question FOUR

a) i. A copper sphere is suspended with a thread below liquid surface on a sketch show the forces acting on the sphere. Explain its equilibrium

ii. If the thread in 4Q(i) above is cut show on the second sketch or explain in words the forces acts on the sphere when falling freely in a large expanse of fluid. Also explain the equilibrium before and after terminal velocity is reached. (13marks)

b) State the THREE Newton Laws of motion. (5marks)

c) Define i. Mass

ii. Weight

(2marks)

Question FIVE

a) Show that Kinetic energy acting on a rotating body K.E = ½ IW_2 where I is measure of inertia of the body about the axis in question W is angular velocity of the body. (10marks)

b) Define (i) torque

(ii) centripental force (2marks)

c) i. State the principle of conservation of momentum

ii. A shaft rotating at 3.0×10^3 revolutions per minute is transmitting a power of 10 kilowatts Find the magnitude of the driving couple. (8marks)

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CHEMISTRY I

SEMESTER 1 EXAMINATION APRIL/MAY 2010

TIME : 2 HOURS

Instructions

Answer question ONE is Compulsory and any TWO questions.

Question ONE

a) i. List the THREE factors that influences ionization energy

ii. Explain the effect of the above factors in a(i) on 1^{st} ionization Energy values across a particular period and down a particular group. (10 ½ marks)

b) State the factors that influences

i) Formation of ions

ii) Hydrogen bond formation. (3 ½ marks)

c) Use any THREE theories to define an acid and a base. (9marks)

d) Obtain a Redox equation for Reaction between lithium metal and oxygen gas. (7marks)

Question TWO

a) i. List THREE types of Radioactive radiations.

ii. Explain how their emittion by a radioactive isotope would affect its mass number and atomic number. (6marks)

b) State the TWO main cause of Radioactivity. (4marks)

c) List THREE

i) Uses

ii) Hazards of Radioactivity. (6marks)

d) Write electronic configuration of the following elements inform of s,p,d,f notation .

11^{W} 13^{X} 16^{Y} 18^{Z}

(4marks)

Question FOUR

a) During self-ionisation of water it acts as an acid and also as a base. Write the two equations for self ionization of water . showing clearly which represents Acidic basic behavior. (4marks)

b) List FOUR important types of Redox reactions. Give ONE examples in each case. (12marks)

c) List two types of hardness. Give all the ions in the above types of water hardness. (4marks)

Question FIVE

a) Explain the formation of the following types of interatomic bonds.

i) Ionic

ii) Coralent

iii) Metallic (12marks)

b) Define i. Co-polymer

ii. Homopolymer (2marks)

c) List THREE types of co-polymer and differentiate between them by giving an example. (6marks)