



TECHNICAL UNIVERSITY OF MOMBASA
FACULTY OF APPLIED AND HEALTH SCIENCES
DEPARTMENT OF MATHEMATICS & PHYSICS

UNIVERSITY EXAMINATION FOR:

DIPLOMA IN BUILDING AND CIVIL ENGINEERING (DBCE YISI)

APS 2100 PHYSICAL SCIENCE FOR ENGINEERS

END OF SEMESTER EXAMINATION

SERIES:AUGUST 2019

TIME:2 hoursHOURS

Instructions to Candidates

You should have the following for this examination

-Answer Booklet, examination pass , student ID,Scientific calculator and no mobile phones,

This paper consists of five questions. Attempt any **THREE** questions.

Do not write on the question paper.

Question ONE

(a) state and or define the following terms as applied in simple harmonic motions

(i)Hooke's law

(ii)stiffness

(iii)periodic time

(iv)frequency

(4mks)

(b) A string of stiffness 200N/M has a mass of .75 kg. A mass of 5kg is attached to the free end and set in motion.find the time of oscillation.

(i)Neglecting the mass of the spring

(ii)Allowing for the mass of the spring

(6mks)

(c)On resolution of forces and representation:

(i)Two forces of $400\text{N}60^\circ$ and $600\text{N}150^\circ$ act at a point.Draw vectors representing the two forces and calculate the total vertical and horizontal force.

(ii) A lathe saddle exerts a normal pressure on its bed of 200N. If the coefficient of friction between the saddle and bed is 0.14, calculate the force parallel to the bed required to slide the saddle along the bed (10mks)

Question TWO

(a) State Ohm's law and define and/or explain the following terms as used in alternating quantities in electricity

(i) Periodic time

(ii) Instantaneous values

(iii) Maximum values

(iv) Average values

(v) Root mean square (R.M.S) values

5mks)

(b) With aid of a diagram, briefly explain the production of alternating current

(6mks)

(c) Three resistors 8R, 16R, and 32R are connected in parallel across a 16-V supply, calculate

(i) Current through each resistor and

(ii) Current taken from the supply

(iii) A calorimeter contains 0.2kg of water at 16°C, the water equivalent of the calorimeter is 0.02kg. The heating element takes 1.5A from a 12V supply. Calculate the time taken to raise the temperature of the water to 24°C assume no heat loss

(9mks)

Question THREE

(a) define the following as applied in oscillations

(i) Amplitude

(ii) periodic Time

(iii) Frequency

(iv) Damping

(4mks)

(b) A piston of mass 0.5kg moves with S.H.M .If the amplitude of the piston oscillation is 90mm and its frequency is 20Hz, calculate:-

(i) The maximum acceleration

(ii) The maximum velocity

(iii) The maximum kinetic energy

(9mks)

(c) With aid of a diagram explain in detail simple Harmonic Motion and show that the angular velocity $V_N = W\sqrt{r^2 - x^2}$ where r and x are the amplitude and displacement respectively

(7mks)

Question FOUR

(a)(I) Define the following terms as related to matter

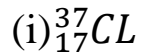
(i) Atom

(ii) Element

(iii) Compound

(iv) Mixture

(II) State the number of protons and the number of neutrons in one atom of each of the following isotopes



(ii) Mercury-202 (take mercury atom number as 80). Indicate the atomic notation of mercury (Hg)

(8mks)

(b)(i) write the electronic structure of Sodium -11 and Bromine -25 and in so doing explain the general atomic shell structuring indicating subatomic particles.

(ii) Explain the resultant radiation as associated in radioactive metal (Name a few) indicating the release of energy phenomenon

(12mks)

Question FIVE