Candidate's Examination Number.....

SMZ

ZANZIBAR EXAMINATIONS COUNCIL

FORM THREE ENTRANCE EXAMINATION

054 ENGINEERING SCIENCE

TIME 2:30 HOURS FRIDAY 05TH NOVEMBER, 2021 A.M

INSTRUCTIONS TO CANDIDATES

1. This paper consists of THREE (3) sections A, B and C.
2. Answer ALL questions in sections A, B and C.
3. ALL answers must be written in the space provided.
4. All working must be written in black or blue ink and diagrams must be in pencil.
5. Write your examination number on every page of this booklet.
6. Calculators, cellular phones and unauthorized materials are not allowed in the examination room.

FOR EXAMINER'S USE ONLY					
QUESTION NUMBER	MARKS	SIGNATURE	QUESTION NUMBER	MARKS	SIGNATURE
1			6		
2			7		
3			8		
4			9		
5			10		
TOTAL					

This paper consists of 12 printed pages

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SECTION A: (15 Marks)

Answer all questions from this section

1. Choose the letter of the correct answer and write it below the item number in the table below.

   i) One of the units used to express work done is

   A: J/s B: m/s C: Nm D: N

   ii) The ability of an object to float is known as

   A: Archimedes principle B. Buoyancy

   C: Floatation D. Law of floatation

   iii) The work done by a crane used to lift a weight of 4000kg through a height of 12m is

   A: 48KJ B: 4.893KJ C: 470.88KJ D: 3.27KJ

   iv) The ratio of power output to power input is known as

   A: Efficiency B: Effort

   C: Mechanical advantage D. Velocity ratio

   v) The internal and external diameters of a tube can be measured by using

   A: Micrometer screw gauge B: Meter rule

   C. Vernier height gauge D: Vernier calipers

   vi) This is not an example of force

   A: Gravity B: Newton C: Repulsion D. Tensional

   vii) F= ma. This is a

   A: law of inertia B: momentum change

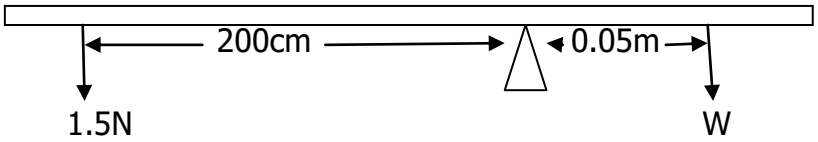
   C: Newton's second law of motion D: Newton's third law of motion

   viii) For a body moving upward, then

   A: Acceleration is zero B: Acceleration is $10ms^{-2}$

   C. Final velocity is zero D: Initial velocity is zero

ix) Given the figure below



If the rod is balanced, then the weight W is equal to:

A: 6000N B: 600N C: 60N D: 6N

x) Which of the following is not a form of energy?

A: Heat B: Light C: Sound D. Weight

Answers

i	ii	iii	iv	v	vi	vii	viii	ix	x

2. Match the term related to light energy in **Column A** with the meaning of the term in **Column B** by writing its letter below the item number in a given table.

Column A	**Column B**
i. Transparent materials	A: A group of light rays
ii. Light ray	B: Allow only part of the light to pass through them
iii. Opaque materials	C: material that allows light to pass through them
	D. A straight line with an arrow
iv. Translucent materials	E: The path along which light energy travel in a Medium
v. Beam of light	F: Materials that do not light to pass through at all
	G: Materials that allow heat to pass through them

Answers

i	ii	iii	iv	v

Candidate's Examination Number.....

SECTION B: (70 Marks)

Answer ALL questions from this section.

3. a) One of the students in your school told you that he cannot distinguish the term adhesion from cohesion. How can you help him?

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b) State the kinetic theory of matter.

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c) Each state of matter has its specific examples. Support this statement by filling the table below

State	Examples
i)	a) Wooden box b) lead shots
ii) Gas	a) b)
iii)	a) Milk b) Water

4. a) Errors in measurements come from different sources. State any four (4) common sources of errors.

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b) Briefly explain the following types of errors.

i) Parallax error

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ii) Zero error

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iii) Instrumental error

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c) Mention the quantity that can be measured by each of the following instruments.

i) Beam balance _____

ii) Measuring cylinder _____

iii) Tape measure _____

5. One of the students in Form 2 was absent during the Engineering Sciences lesson and asked you to give him brief information related to sound wave.

a) Give the meaning of the following terms.

i) Sound wave ii) Reflection iii) Refraction

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b) Write down the relationship between velocity, frequency and wave length.

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c) Speed of sound in a metal is 1000 m s^{-1}. What is the wavelength if the frequency is 2 kHz?

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6. a) i) Analyze three (3) advantages of friction.

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ii) List down two (2) methods that can be used to minimize friction.

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b) i) Write down formula that connect frictional force and the normal reaction force.

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ii) A normal force of 250N acting between the object and the ground. If the coefficient of friction is 0.13, determine the frictional force.

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7. a) Efficiency of a machine never reaches 100%. As a young scientist, give the reason(s).

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b) People use different types of simple machines to simplify their works. Identify any four (4) examples of simple machines.

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c) A machine having a velocity ratio of 5 requires 600J of work to raise a load of 400J, If the load moved through a distance of 0.5m. Calculate

i) The mechanical advantage

ii) Efficiency of a machine

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8. a) i) Name any three (3) sources of light.

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ii) Distinguish between luminous bodies and non-luminous bodies.

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b) Explain five (5) Characteristics of an image formed by a plan mirror.

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9. a) State five (5) applications of science in real life.

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b) i) Give the difference between derived physical quantities and fundamental physical quantities.

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ii) Identify any three (3) fundamental physical quantities.

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SECTION C: (15 Marks)

Answer ALL questions from this section.

10. a) Your brother has a radio set that needs 9V and a calculator that requires 0.75V to operate. He has a box containing ten 1.5V dry cells. Show how you will obtain 9V for the radio and 0.75V for his calculator.

b) Suppose that your engineering science teacher has kept a swath, 3V battery, two electric bulbs and a piece of wire 1m long on a bench. Construct an electric circuit that will be used to light ON and OFF a light bulb using the given materials.

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