

Candidate's Examination Number.....

**SMZ**

**ZANZIBAR EXAMINATIONS COUNCIL**

**FORM THREE ENTRANCE EXAMINATION**

**054**

**ENGINEERING SCIENCE**

**TIME: 2:30 HOURS**

**THURSDAY 24<sup>TH</sup> DECEMBER 2020 A.M**

**INSTRUCTIONS TO CANDIDATES**

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

<b>FOR EXAMINER'S USE ONLY</b>					
<b>QUESTION NUMBER</b>	<b>MARKS</b>	<b>SIGNATURE</b>	<b>QUESTION NUMBER</b>	<b>MARKS</b>	<b>SIGNATURE</b>
<b>1</b>			<b>8</b>		
<b>2</b>			<b>9</b>		
<b>3</b>			<b>10</b>		
<b>4</b>			<b>11</b>		
<b>5</b>			<b>12</b>		
<b>6</b>			<b>13</b>		
<b>7</b>			<b>14</b>		
<b>TOTAL</b>					

This paper consists of 16 printed pages

### SECTION A: (10 Marks)

**Attempt ALL questions from this section.**

1. Choose the correct answer and write its letter in the table provided below.
- i) It is used to measure length  
A: Eureka can  
B: Vernier calipers  
C: Stop watch  
D: Spring balance
- ii) The ability of an object to float is called  
A: Floatation  
B: law of floatation  
C: Archimedes principle  
D: Buoyancy
- 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 termed as  
A: Mechanical advantage  
B: Effort  
C: Velocity ratio  
D: Efficiency
- v) The internal and external diameters of a tube can be measured by using  
A: Micrometer screw gauge  
B: Vernier height gauge  
C: Vernier calipers  
D: Meter rule
- vi) This is not an example of force  
A: Gravity  
B: Newton  
C: Tensional  
D: Repulsion
- 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, the  
A: final velocity is zero  
B: initial velocity is zero  
C: Acceleration is zero  
D: Acceleration is  $10\text{ms}^{-2}$
- ix) Which one of the following is not a form of energy?  
A: heat  
B: light  
C: Weight  
D: sound
- x) All of the following units are used to express the volume of a liquid except  
A:  $\text{cm}^3$   
B: Litre  
C:  $\text{cm}^2$   
D:  $\text{m}^3$

## Answers

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**SECTION B: (30 Marks)**

**Attempt ALL questions from this section.**

2. a) Define the term momentum.

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- b) State the SI Unit of momentum.

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3. a) Mention any four (4) effects of forces.

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- b) If an object has a mass of 200g, how much would it weigh on the earth?

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4. A stone of mass 10kg is dropped from rest to the ground 10m downward.  
If it hits the ground with a velocity of 20m/s, determine
- a) Kinetic energy
- b) Potential energy

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5. Distinguish between the following:

i) Speed and velocity

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ii) Distance and displacement

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6. 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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7. a) Define the term "inertia"

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- b) Identify three (3) types of inertia.

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8. a) Give two (2) differences between angular velocity and linear velocity.

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- b) Convert the following in to rad/sec

- i) 200rev/min

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ii) 500rev/min

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9. a) Name two (2) apparatus suitable for the measurement of volume of irregular object.

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b) Define relative density.

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10. The brakes were applied and the car slows down from 20m/s to 5m/s in 3s.  
What is the car's acceleration?

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11. a) State Ohm's law.

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- b) Name the instrument used to measure potential difference.

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### SECTION C: (60 Marks)

**Attempt ALL questions from this section.**

12. a) State the following:

- i) First Newton's law of motion.
- ii) Law of conservation of momentum.

- b) A car starts from rest and accelerate uniformly at  $2\text{m/s}^2$  for 6s. It then maintains the constant speed for a half a minute and then retarded uniformly to rest in 5s.

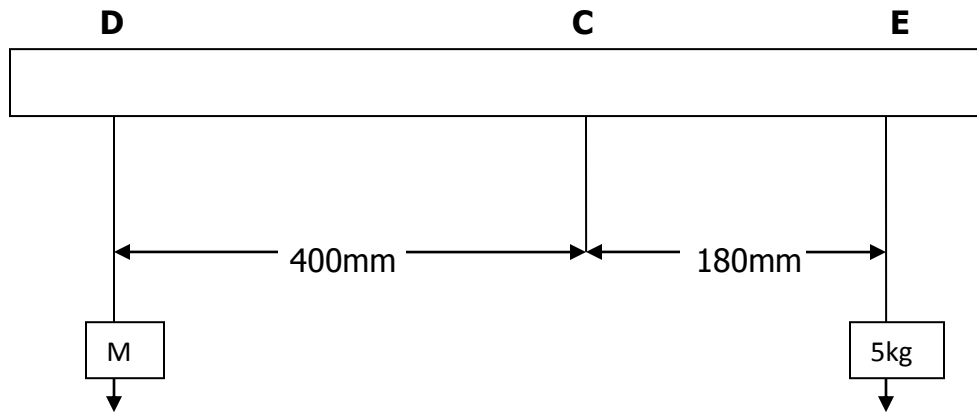
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- Draw a velocity time graph and use it to determine
- The distance covered in each stage
- The maximum speed reached

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13. a) List down the necessary conditions for an object to be in equilibrium.
- b) i) Define the term torque  
ii) Give the unit of torque
- c) With reference to figure below, a uniform liver is pivoted at C. A body having a mass of 5kg is suspended at E, 180mm to the right of C. Determine the mass to be suspended at point D, 400mm to the left of C to maintain the lever at balance.

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14. a) An iron cube of volume  $800\text{cm}^3$  is totally immersed in
- i) Water
  - ii) Oil of density  $0.8\text{g/cm}^3$
  - iii) Oxygen of density  $0.0015\text{g/cm}^3$ . Calculate the up thrust in each case if the weight of 1g mass =  $0.01\text{N}$ .
- b) A solid body with irregular shape has a mass of 178 g. The body is totally immersed in water of volume  $60\text{cm}^3$  contained in a measuring cylinder. If the final volume of water is  $80\text{ cm}^3$ , calculate the density of the body.

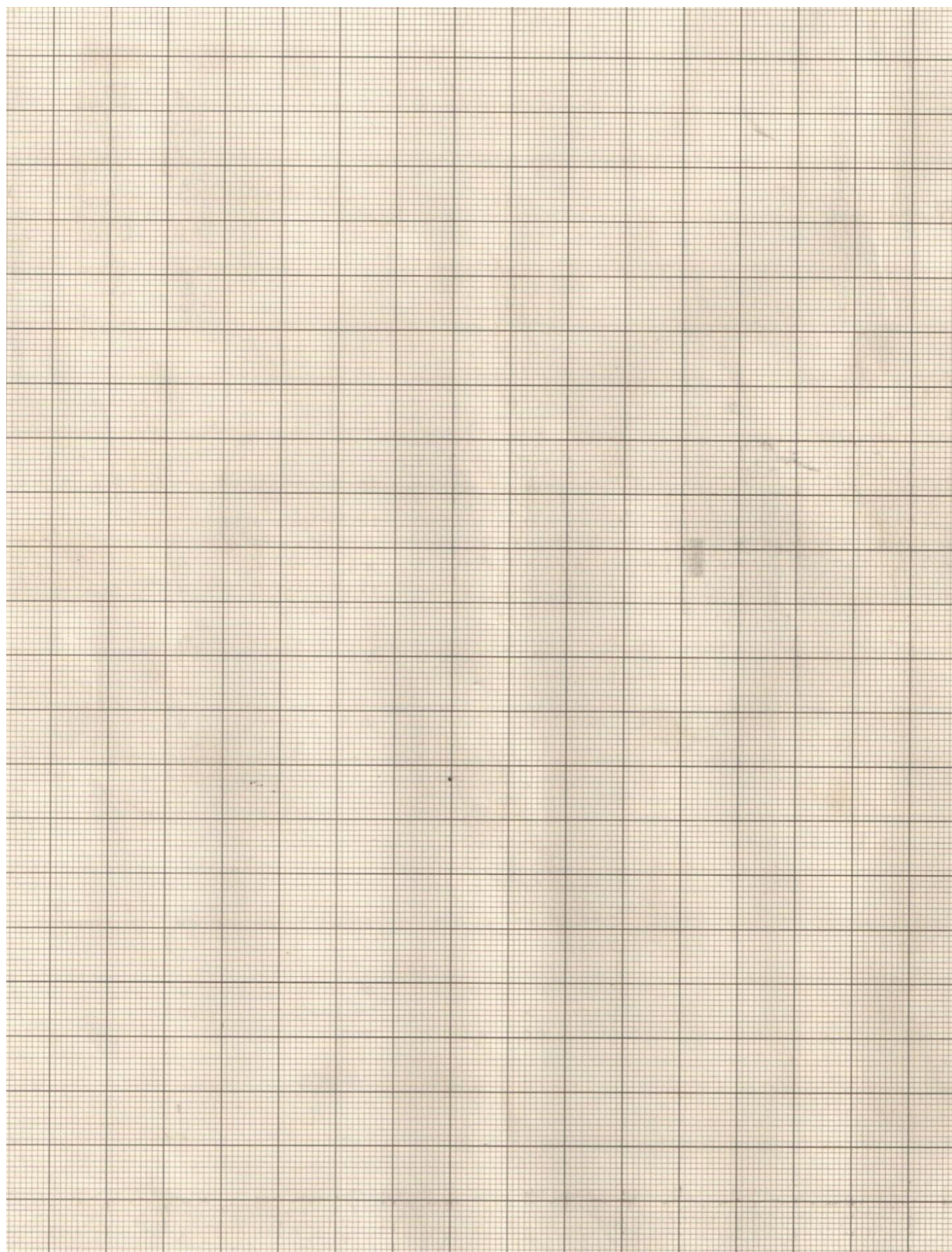
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