

**MsomiBora.com**

**THE PRESIDENT’S OFFICE**

**REGIONAL ADMINISTRATION AND LOCAL GOVERNMENT**

**ARUSHA CITY COUNCIL**

**FORM FOUR PRE-NATIONAL EXAMINATION, SEPTEMBER 2019**

**PHYSICS**

**INSTRUCTIONS Time: 3Hours**

* This paper consists of three sections A, B, and C
* Answer all question in Section A and B and only two questions from section C
* All working must be shown clearly
* Where necessary you may use the following constants

1. Acceleration due to gravity = 10m/s2
2. Density of water = 1g/cm3 or 1000kg /m3
3. Speed of light = 3x108 m/s
4. Velocity of second in air = 340m/s
5. Specific heat capacity of ice = 2.1 x103 J/kg oC
6. Specific heat capacity of water = 4.2 x 103 J/kgoC
7. Specific latent head of fusion of ice = 3.34x105 J/Kg
8. Specific latent heat of vaporization of water = 2.26 x 106 J/kg
9. II = 3.14

**SECTION A (15 MARKS)**

1. Choose the most correct answer by writing the letter of the correct response against a number in the answer sheet provided
2. Why do we study physics
3. In order to be Engineers, Doctors, teachers and Geologists
4. In order to be intellectual and practical
5. In order to use scientific observations
6. In order to use brain to learn and understand the idea about science practically and finding solution to practical problem
7. A stone has a mass of 450g and volume of 150cm3 its density is
8. 3kg /m3
9. 0.3g/cm3
10. 3g/cm3
11. 3g/m3
12. The sensitivity of the thermometer depends on the size of the bulb and the bore. For this reason the sensitive thermometer has
13. A narrow bore and small bulb
14. A wide bore and small bulb
15. A wide bore and large bulb
16. A narrow bore and large bulb
17. One of the following is a property of an image formed in a plane mirror
18. Smaller than the object
19. Larger than the object
20. Virtual image
21. Real image
22. If the brakes of a vehicle on a horizontal road are applied suddenly, the main energy change is
23. Potential energy to Head energy
24. Chemical energy to heat energy
25. Kinetic energy to sound and heat energy
26. Kinetic energy to potential energy
27. Which of the following scientific statement needs to be proved through scientific research?
28. Hypothesis
29. Proposal
30. Principle
31. Conclusion
32. In the laboratory the diameter of a wire can accurately be measured by:
33. Micrometer screw gauge
34. Vernier calipers
35. Metre rule
36. Tape measure
37. Which of the following energy sources is non- renewable?
38. Oil and natural gas
39. Fossils, sun oil and nuclear energy
40. Water, wind wood and natural gas
41. Wind, sun, oil and fossil
42. Good absorbers of radiant heat energy are said to be
43. Good reflectors
44. Good radiators
45. Good conductors
46. Poor conductors
47. When a body is charged by friction the transferred charges are
48. Electrons
49. Protons
50. Neutrons
51. None of the above
52. Match the item in LIST A with the responses in LIST B writing the letter of the correct response beside the item number.

|  |  |
| --- | --- |
| **LIST A** | **LIST B** |
| 1. Gold leaf electroscope 2. Thermopile 3. Bimetallic strip 4. Hygrometer 5. Hypsometer | 1. Temperature of boiling water is recorded under normal atmospheric pressure 2. Isobars of hydrogen 3. Detects Radiation 4. Used to determine to upper fixed points of thermometer 5. Isotopes of hydrogen 6. Used in thermostats 7. Used in thermometer and valves 8. Used to measure relative humidity 9. Used to measure density 10. Used to detect the presence of electric charges |

**SECTION B (60 MARKS**)

1. (i) Differentiate elastic collision from inelastic collision

(ii) An 8kg objects is moving right at 4m/s collides elastically head on with a

stationary 10 kg objects. If after collision they stick together, what is

their final velocity?

1. A car is moving with a uniform acceleration from 5m/s to 25m/s in 15 seconds
2. Sketch the velocity time graph for the whole motion
3. Find the total distance covered by the car using the graph in (i) above
4. Find the acceleration of the car
5. (a)(i) Explain why most aged people do not want to hear loudy sounds?

(ii) What is the difference between noise and musical sound

(b) (i) List three main properties of musical sounds

(ii) Define the terms beat frequency

(c) A plucked string of length 30cm has a mass per unit length of 0.5kg/m. If

the tension in the string is equal to 40N. Find

1. The fundamental frequency (f0)
2. The first over tone frequency (f1)
3. The second overtone frequency (f2)
4. (a) List the factors that determine the resistance of a conductor

(b) Define resistivity of the material and state its SI Units

(c) Two resistors of 2Ω and 5Ω are connected in parallel, then connect in series to a 3Ω resistors. If a cell of 4V is connected across the resistors, Calculate.

1. Total resistance
2. Current through 5Ω resistor
3. Current through 2Ω resistor
4. (a) Explain the terms mechanical advantage velocity ratio and efficiency as

applied to a machine and state the relationship between them

(b) Briefly explain why it is important to keep the Centre of gravity of a

motor- bus as low as possible.

(c) Find the power required to pump 15kg of water in one second a height of

30m

1. (a) Give any four factors affecting the rate of evaporation of a liquid

(b) What is the significance of the anomalous expansion of water?

(c)How much heat will be required to convert 100g of ice at – 10oC to water at

its boiling points?

1. (a) Describe the forward and reversed bias for a PN- Junction device

(b) Name the primary colours. What colour is complimentary to blue ? Give a

reason for your answer

(c) A moving – coil galvanometer has the resistance of 3.0Ω and gives a full

scale deflection for a current of 3.0mA How can it be converted into a

voltmeter reading to 15V?

**SECTION C (25 MARKS)**

**Answer only two (2) question in this section**

1. (a) (i)Explain how the Kinetic energy of electron can be increased from the

metal surface?

(ii) State one way in which cathode rays differ from electromagnetic

waves? What experiment would you carry out to show this difference?

(b ) Radon Decays to RadiumRa by the emission of 2 β- particles.

Write down the nuclear equation.

(c) (i) By using thin lens formula and magnification show that

magnification is given by m=

(ii) A concave mirror of focal length 20cm produces an upright image of

magnification 3. By drawing, find the distance of the object from the mirror

1. (a) (i) Mention two types of volcano

(ii) Distinguish between constellation and galaxy

(iii) Mention any three (3) application of astronomy in daily life

(b) Explain three measures that can be taken to control global warming

(c) A satellite is launched at a distance of 40km from the planet making a

revolution of 20 days around the planet. What is the speed of the

satellite?

(d) Explain why in everyday life, light bodies like feather are observed to fall

down more slowly than iron balls

1. (a) (i) State the law of floatation

(ii) A metal cube weighs 1.0N in air and 0.8N when total immersed in

water. Calculate the volume of the cube and its density.

(b) (i) Give three applied of surface tension and capillarity in daily life

(each case)

(ii) State the kinetic theory of matter

(c) Explain why a platinum wire can be sealed through glass and maintain

this seal over a wide temperature range, but a copper wire cannot .

(d) If 100cm3 of a gas and its temperature falls from 15oC until the volume

of the gas at constant pressure decreases to 80cm3 what is the new

absolute temperature?