Question No.	Marks Awarded
1	
2	
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Open Competitive Examination for Recruitment to the Posts of Meteorological Observer/Communicator(to the Training Grade) of the Sri Lanka Technological Service of the Department of Meteorology - 2016 (2017)

(02) Subject Related Technical Question Paper

- Answer **all** questions **on this paper itself.**
- State clearly how you get the answer, **on the dotted lines.**
- Statistical tables will be provided.
- ($g=10\,\mathrm{m\,s^{-2}}$, $\pi = 3$, coefficient of viscosity of water = $1 \times 10^{-3}\,\mathrm{N\,s\,m^{-2}}$)   **Index No:**........................

(Two hours)

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1. (i) A missile which was projected so as to have a maximum horizontal range of 2 kilometres, blasts into two equal pieces at the maximum height. One piece falls back to the starting point. Find the distance to the place where the other piece falls from the starting point.

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(ii) The weight of a person in a stationary rocket was indicated as 600 N in a scale. The rocket then started accelerating uniformly in the vertical direction for 100 seconds and the reading of the scale became 690 N. During the next 50 seconds the scale reading was found to be 630 N which finally became 600 N.

   (a) Find the **accelerations** of the rocket.

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(b) Draw a velocity-time graph and find the height that the rocket reached during the first 200 seconds.

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Index No :........................

2.   (i)   A spherical drop of rain water which falls at a terminal velocity V_o in air, breaks into two equal spherical droplets. Find the terminal velocity with which a small droplet falls.

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(ii)   Two spheres made of materials with the relative density of 0.6 and 1.6, and with the radius of 5 mm each, were attached to each other with a thin light string and released in water. Find the terminal velocity that the system achieves.

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(iii)   If the string was broken after the system achieved terminal velocity, find the subsequent terminal velocity of each sphere.

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[See page four.

3. (i) Write down the "Boyle's law" and "Charles' law".

Boyle's law : ....

.... [See page five.

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Charles' law : ....

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(ii) A uniform glass tube closed at one end, with the cross sectional area of $10 \, cm^2$ and length of 1.5 m was immersed vertically and completely in mercury at $27°C$ which is the room temperature so that its closed end is at the mercury surface. If half of the tube was full of mercury, find the atmospheric pressure in centimetres of mercury.

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(iii) If the tube is gradually immersed vertically downwards find the depth to the closed end of the tube from the mercury surface, when the length of the air column becomes 50 cm.

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(iv) When the temperature of mercury is increased to $t_1°C$, while the closed end is on the mercury surface as mentioned in part (ii) above, the length of the mercury column inside the tube was reduced to 70 cm. Find the value of t_1.

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4. (i) Write down "Kirchhoff's laws" in electricity.

First law : ....

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Second law : ....

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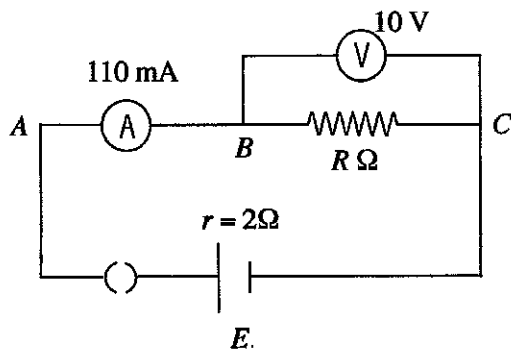
(ii) The reading of the ammeter A shown in the diagram is 110 mA and the reading of the voltmeter V is 10 V.

The internal resistances of the ammeter and the voltmeter are 10 Ω and 1000 Ω respectively.

Calculate the following.

(a) Current in the voltmeter

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(b) Value of resistance R

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(c) Electromotive force of the cell (E)

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(iii) Find the readings of the ammeter and the voltmeter if the voltmeter V in the above circuit is connected across *AC* instead of *BC*.

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