Gothami Balika Vidyalaya - Colombo 10
ගෝතමී බාලිකා විද්‍යාලය - කොළඹ 10

01 E I

First Term Diagnostic Test, March 2023
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Physics I භෞතික විද්‍යාව I	Grade 12 12 වන ශ්‍රේණිය	Two hours පැය දෙකයි

NOTE :

* Answer **all the** question.
* Answer questions from **1 to 15** using (1), (2), (3), (4), (5) answer by selecting the **correct or most appropriate** answer. **Indicate the answer in the given answer script using a cross.**

01. If the earth is a uniform sphere of radius r and density d, Gravitational intensity (g) of the earth is given by the following equation.

$g = K\,rd$

The units of the constant K is,

1) $kg\,ms^{-2}$ 2) $kg\,m^{-1}\,s^{-1}$ 3) $kg\,m^{-3}\,s^{-2}$
4) $kg^{-1}\,m^{3}\,s^{-2}$ 5) $kg^{-1}\,m^{2}\,s^{-2}$

02. The relation among the pressure (P), volume (V) the number of moles (n), absolute temperature (T) of a real gas is given below.

$(P + \frac{a}{V^2})(V - b) = nRT$

Where a and b are constants and R is universal gas constant. The dimensions of the ratio ($^{a}/_{b}$) is.

1) ML^2T^{-2} 2) ML^3T^{-2} 3) ML^4T^{-2} 4) ML^5T^{-2} 5) M

03. Which of the following combinations of quantities does not represent vector quantities.

1) $^{Displacemenet}/_{Time}$ 2) Force × Time 3) Force × Distance
4) Mass × Acceleration 5) Mass × Velocity

04. The main scale of a spectrometer consist of 0.5^{o} devisions. 29 of its divisions divide in to 30 equal divisions to make a vernier scale. It's least count in minutes is

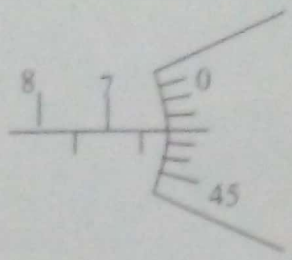
1) $60'$ 2) $30''$ 3) 15^{o} 4) 2^{0} 5) $1'$

05. Unit to measure the solid angle is

1) Degrees 2) Radians 3) Radian seconds
4) Radians per second 5) Steradian

06. A micrometer screw gauge is set to make a measurement. Its circular scale consists of 50 equal divisions and its pitch is 0.5 mm. The recorded measurement is,

1) 8.9 mm
2) 8.98 mm
3) 9.00 mm
4) 9.1 mm
5) 9.20 mm

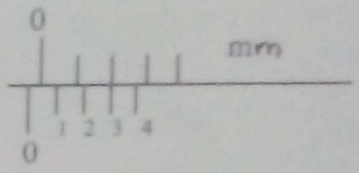


07. Dimensions of the coefficient of friction is.

1) MLT^{-2}
2) $ML^{-1}T^{-2}$
3) MT^{-1}
4) MLT^{-1}
5) No dimensions

08. The figure shows a vernier caliper when it's jaws are in contact. If 9 mm of the main scale has been divided in to 10 equal divisions of the vernier caliper, its zero error is,

1) + 0.2 mm
2) - 0.3 mm
3) +0.3 mm
4) + 0.7 mm
5) - 0.7 mm

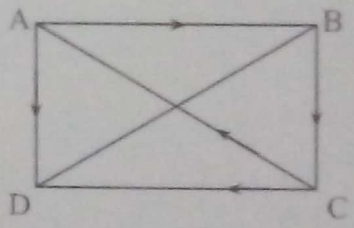


09. A circular scale of an instrument consist of ½ ° divisions. This instrument has been made in dividing 14 divisions of the main scale in to 15 equal divisions. The least count of the instrument is,

1) $\frac{1}{360}^{\circ}$
2) $\frac{1}{180}^{\circ}$
3) $\frac{1}{120}^{\circ}$
4) $\frac{1}{60}^{\circ}$
5) $\frac{1}{30}^{\circ}$

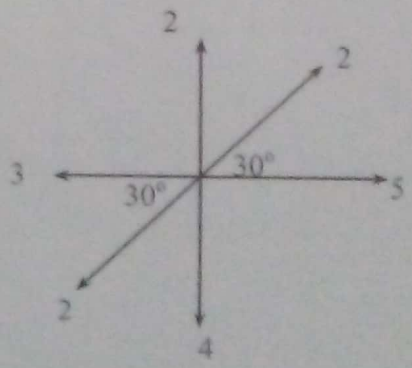
10. The resultant of this is,

1) $\overrightarrow{AC}$
2) $\overrightarrow{BD}$
3) $\overrightarrow{AB}$
4) $\overrightarrow{CA}$
5) $\overrightarrow{DB}$

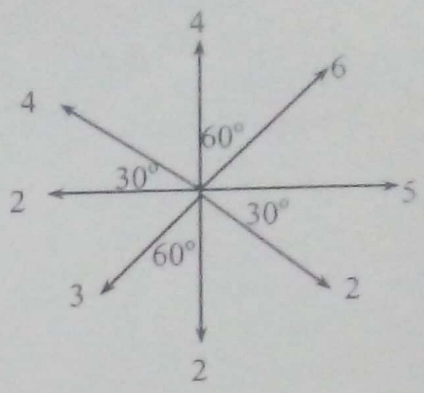


11. The resultant of this system of forces.

1) $\sqrt{8}$ ↗
2) $\sqrt{8}$ ↘
3) 3 ↑
4) $\sqrt{5}$ →
5) $\sqrt{8}$ ↑



The resultant of this system is,



1) $\left[\left(3-\frac{\sqrt{3}}{2}\right)^2-\left(\frac{1}{2}\right)^2\right]^{\frac{1}{2}}$

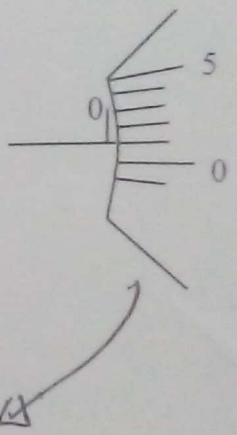
2) $\left[\left(3-\frac{\sqrt{3}}{2}\right)^2+\left(\frac{1}{2}\right)^2\right]^{\frac{1}{2}}$

3) $\left[\left(3-\frac{\sqrt{3}}{2}\right)^2+2^2\right]^{\frac{1}{2}}$

4) $\left[\left(3-\frac{\sqrt{3}}{2}\right)^2+\left(3+\frac{\sqrt{3}}{2}\right)^2\right]^{\frac{1}{2}}$

5) $\left[\left(\frac{\sqrt{3}}{2}\right)^2+\left(\frac{1}{2}\right)^2\right]^{\frac{1}{2}}$

13. Figure shows an adjustment of a micrometer screw gauge of pitch 1 mm. It's circular scale consists of 100 equal divisions. The least count of the instrument is,



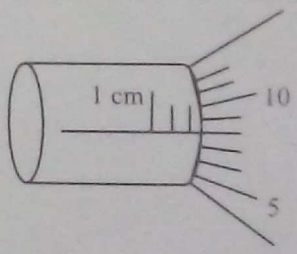
1) 0.01
2) 0.2
3) 0.05
4) 0.1
5) 0.25

14. What is the zero error of the instrument shown in the figure.

1) 0.01
2) 0.45
3) 0.04
4) 0.02
5) 0.03

15. What is the correct reading of the adjustment shown in the figure, if the positive zero error is 0.01 mm.

1) 12.07 mm
2) 12.08 mm
3) 12.09 mm
4) 12.07 mm
5) 2.09 mm



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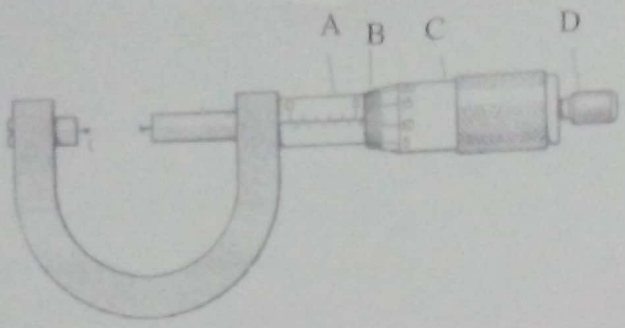
Part - A structural Essay

Answer all the questions.

01.



(i) Name the parts A, B, C, D

A- Sleeve

B - Circular scale

C - Thimble

D - Thimble Head/Ratchet

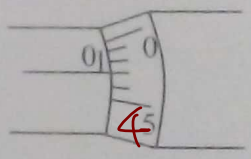
(ii) What is the least count of this instrument?

0.01 mm/ 0.001 cm

(iii) What is the reading of the shown adjustment

(iv) What is the zero error

-0.03 mm



(v) What is the correct reading

(vi) Find the percentage error

(vii) What are the precautions taken to avoid the thrust on the object by the instrument?

Using the thimble head to rotate instead of the Thimble

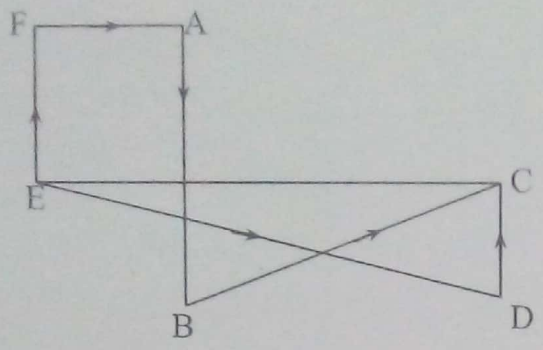
(viii) Name the suitable instruments to find the diameter of a wire and the thickness of a coin

Diameter - Micro Meter Screw Gague Thickness - Spherometer

(ix) Provide reasons for your selection.

nswer all the questions

(a)



(i) Find the resultant of the coplanar system of forces of $\overrightarrow{AB}$, $\overrightarrow{BC}$, $\overrightarrow{DC}$, $\overrightarrow{ED}$, $\overrightarrow{EF}$ and $\overrightarrow{FA}$

(ii) Construct a relation for the resultant of two vectors P and Q having an angle 60° between them

(iii) Draw a velocity Vs time graph for an object moving with a constant acceleration

(iv) How can you find the distance travelled by that object

(v) Draw a velocity Vs time graph for the motion of a coconut falling from a coconut tree

(vi) The periodic time (T) for a single oscillation of a simple pendulum is depending on its length (l) acceleration due to gravity (g) and the mass of the pendulum (m). Bulb up a relation between these quantities using dimensions.

(vii) $V = at + \frac{b}{t+c}$ where V is velocity and t is time. Find the dimensions and units of a, b and c

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