1. A wire has a mass 0.3 ± 0.003 g, radius 0.5 ± 0.005 mm and length 6 ± 0.06 cm. The maximum percentage error in the measurement of its density is :- **[JEE 2004]**

(A) 1 (B) 2 (C) 3 (D) 4

2. The edge of a cube is $a = 1.2 \times 10^{-2}$ m. Then its volume will be recorded as : **[JEE 2003]**

(A) 1.7×10^{-6} m^3 (B) 1.70×10^{-6} m^3

(C) 1.70×10^{-7} m^3 (D) 1.78×10^{-6} m^3

3. A vernier callipers having 1 main scale division = 0.1 cm is designed to have a least count of 0.02 cm. If n be the number of divisions on vernier scale and m be the length of vernier scale, then :-

(A) n = 10, m = 0.5 cm (B) n = 9, m = 0.4 cm

(C) n = 10, m = 0.8 cm (D) n = 10, m = 0.2 cm

4. In the Searle's experiment, after every step of loading , why should we wait for two minutes before taking the readings? (More than one correct.)

(A) So that the wire can have its desired change in length.

(B) So that the wire can attain room temperature.

(C) So that vertical oscillations can get subsided.

(D) So that the wire has no change in its radius.

5. In a meter bridge set up, which of the following should be the properties of the one meter long wire?

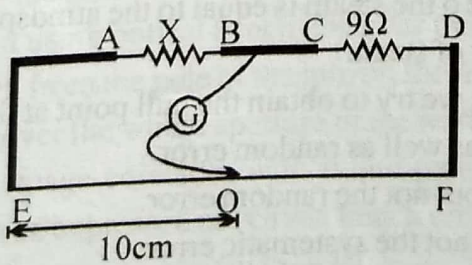
(A) High resistivity and low temperature coefficient

(B) Low resistivity and low temperature coefficient

(C) Low resistivity and high temperature coefficient

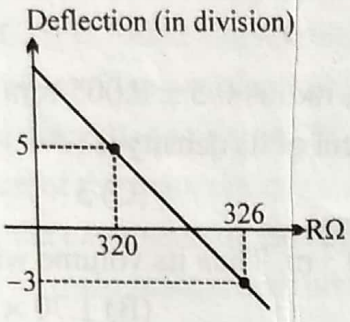
(D) High resistivity and high temperature coefficient

6. Consider the MB shown in the diagram, let the resistance X have temperature coefficient α_1 and the resistance from the RB have the temperature coefficient α_2. Let the reading of the meter scale be 10cm from the LHS. If the temperature of the two resistance increase by small temperature ΔT then what is the shift in the position of the null point? Neglect all the other changes in the bridge due to temperature rise.



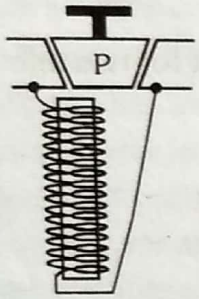
(A) $9(\alpha_1 - \alpha_2)\Delta T$ (B) $9(\alpha_1 + \alpha_2)\Delta T$ (C) $\frac{1}{9}(\alpha_1 + \alpha_2)\Delta T$ (D) $\frac{1}{9}(\alpha_1 - \alpha_2)\Delta T$

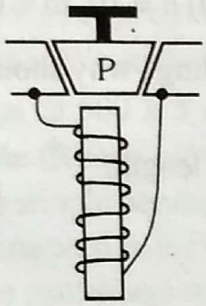
7. For a post office Box, the graph of galvanometer deflection versus R (resistance pulled out of RB) for the ratio 100 : 1 is given as shown. A careless student pulls out two non consecutive values R marked in the graph. Find the value of unknown resistance.

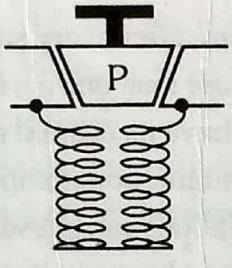


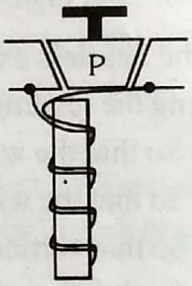
(A) 3.2 ohm (B) 3.24 ohm (C) 3.206 ohm (D) 3.26 ohm

8. Identify which of the following diagrams represent the internal construction of the coils wound in a resistance box or PO box?

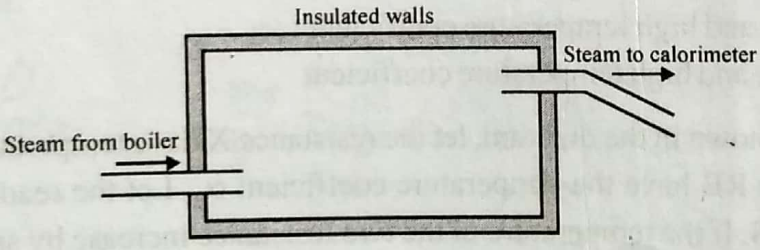
(A) 

(B) 

(C) 

(D) 

9. In the laboratory method for measuring the latent heat of steam, the steam is passed through the device shown below. The function of the device is :-



(A) to prevent condensed steam from reaching the calorimeter
(B) to reduce the pressure of the steam
(C) to ensure that the pressure o the steam is equal to the atmospheric pressure.
(D) to control the rate of flow of steam

10. In a meter bridge experiment, we try to obtain the null point at the middle. This
(A) reduces systematic error as well as random error.
(B) reduces systematic error but not the random error.
(C) reduces random error but not the systematic error
(D) reduces neither systematic error nor the random error

11. An approximate value of number of seconds in an year is $\pi \times 10^7$. Determine the % error in this value
(A) 0.5% (B) 8% (C) 4% (D) 15%

12. In a Searle's experiment for determination of Young's Modulus, when a load of 50 kg is added to a 3 meter long wire micrometer screw having pitch 1 mm needs to be given a quarter turn in order to restore the horizontal position of spirit level. Young's modulus of the wire if its cross sectional area is 10^{-5} m^2 is

(A) $6\times 10^{11} N/m^2$ (B) 1.5×10^{11} N/m^2 (C) 3×10^{11} N/m^2 (D) None

13. On the basis of detail given about two measuring instruments, select the correct statement.

(i) Vernier callipers having main scale division = 0.05 cm and Vernier scale division = $\frac{2.45}{50}$ cm.

(ii) Screw gaugae having pitch 0.5 mm and its circular scale division measures 0.01 mm.

(A) Both the instruments have same least count.

(B) Least count of screw gauge is lesser than that of vernier callipers.

(C) Both the instruments have same least count but screw gauge is more precise.

(D) Both the instruments have different least count and screw gauge is more precise.

14. A student obtained following observations in an experiment of meter bridge to find unknown resistance of given wire :

S.No.	R	ℓ	$100 - \ell$	$S=\left(\frac{100-\ell}{\ell}\right)R$
1	2Ω	43	57	2.65
2	3Ω	52	48	2.77
3	4Ω	58	42	2.89
4	5Ω	69	31	2.25

The most accurate value of unknown resistance will be

(A) 2.65 Ω (B) 2.77 Ω (C) 2.89 Ω (D) 2.25 Ω

15. In which of the following instruments used in the lab there exists an error of random category known as back lash error

(i) Screw gauge (ii) Spherometer (iii) Searle's apparatus (iv) Vernier callipers

(A) (i) & (ii) only (B) (i), (ii) & (iii) only (C) (i) only (D) all four

16. In Searle's apparatus, when experimental wire is loaded and unloaded, the air bubble in spirit level gets shifted.

(A) towards reference wire while loading & towards experimental wire while unloading

(B) towards experimental wire while loading & towards reference wire while unloading

(C) towards experimental wire, both the times, during loading & unloading

(D) towards reference wire, both the times during loading & unloading

17. A student performing experiment using optical bench observes that when concave mirror is at zero, and tip of object needle is at 10 cm from the pole of the mirror, the fixture of object needle mark reads x cm, and it's image appears to cover the whole aperture of the mirror. Now, when the object needle is moved to y cm, it's inverted image coincides with it and parallax is removed, then the bench correction (index correction) can be expressed as (Given bench error is positive for object needle)

(i) x – 10 (ii) y–20 (iii) x + 10 (iv) y + 20

Choose the **CORRECT** option.

(A) (i) and (ii) (B) (ii) and (iii) (C) (i) and (iv) (D) (iii) and (iv)

18. A student is experimenting with resonance tube apparatus in Physics lab to find the speed of sound at room temperature. He got resonating lengths of air column as 17 cm and 51 cm, using tuning fork of frequency 512 Hz. Find speed of sound at room temperature and specify, whether the side water reservoir was moved upward or downward to obtain the second resonance (51 cm)?

(A) 348 m/s, downwards (B) 348 m/s, upwards

(C) 332 m/s, downwards (D) 332 m/s, upwards

19. Accuracy and precision are _____(i)_____ and these are respectively linked with _____(ii)_____ & _____(iii)_____ .Fill the blanks above in correct order.

(A) (i) same, (ii) systematic error, (iii) random error

(B) (i) different, (ii) systematic error (iii) random error

(C) (i) same, (ii) random error, (iii) systematic error

(D) (i) different, (ii) random error, (iii) systematic error

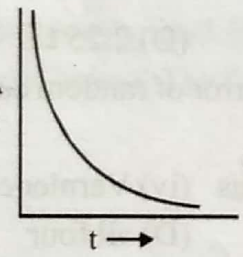
20. The vernier of a circular scale is divided in to 30 divisions, which coincides with 29 main scale divisions. If each main scale division is $(1/2)^\circ$, the least count of the instrument is

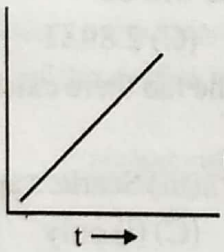
(A) 0.1' (B) 1' (C) 10' (D) 30'

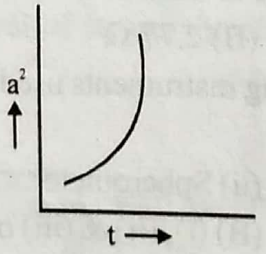
21. When the gap is closed without placing any object in the screw gauge whose least count is 0.005 mm, the 5th division on its circular scale coincides with the reference line on main scale, and when a small sphere is placed reading on main scale advances by 4 divisions, whereas circular scale reading advances by five times to the corresponding reading when no object was placed. There are 200 divisions on the circular scale. The radius of the sphere is

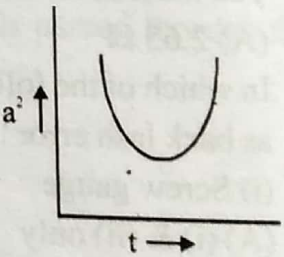
(A) 4.10 mm (B) 4.05 mm (C) 2.10 mm (D) 2.05 mm

22. In an experiment to find loss of energy w.r.t. time in the case of swinging simple pendulum the correct graph between $(amp)^2$ and time is -

(A) 

(B) 

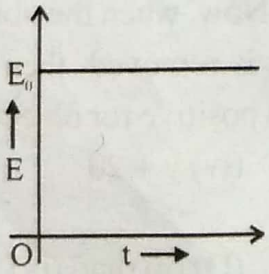
(C) 

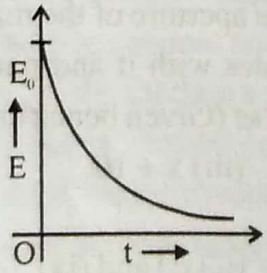
(D) 

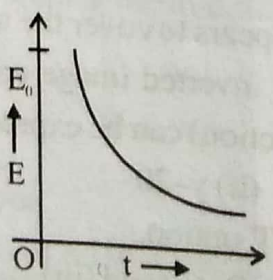
23. Amplitude of vibrations of simple pendulum is A. It becomes $\frac{A}{3}$ after 20 seconds. The amplitude after 60 seconds will be -

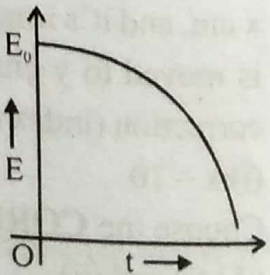
(A) $\frac{A}{6}$ (B) $\frac{A}{8}$ (C) $\frac{A}{9}$ (D) $\frac{A}{27}$

24. Variation of energy of the bob E moving in viscous medium as function of time t is shown graphically as -

(A) 

(B) 

(C) 

(D) 

25. In Searle's apparatus we have two wires. During experiment we study the extension in one wire. The use of second wire is -

(A) to support the apparatus because it is heavy and may not break single wire

(B) to compensate the changes in length caused by changes in temperature of atmosphere during experimentation

(C) to keep the apparatus in level so that extension is measured accurately

(D) all the three above

26. The air bubble in sprit level in Searle's apparatus is at centre. With increase in length of experimental wire towards your right hand, the air bubble will shift towards your -

(A) right towards experimental wire (B) towards compensating wire

(C) towards either of them (D) does not shift

27. The teacher allows all the students of a class to perform the experiment to determine the Young's modulus of elasticity with the same experimental wire. It does not give correct result to the last student because of -

(A) elastic limit (B) elastic fatigue (C) plasticity (D) permanent set

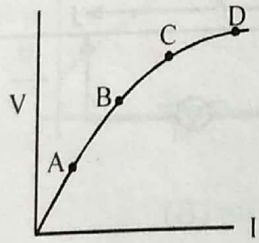
28. While performing the experiment to find out the surface tension of water, Ajay got the height of the water 6 cm during winter. Repeating the same experiment during summer, the height would be

(A) $h > 6$ (B) $h = 6$ (C) $h < 6$ (D) $h = 12$

29. While measuring the speed of sound by performing a resonance column experiment, a student get's the first resonance condition at a column length of 18 cm during winter. Repeating the same experiment during summer, she measures the column length to be x cm for the second resonance. Then -

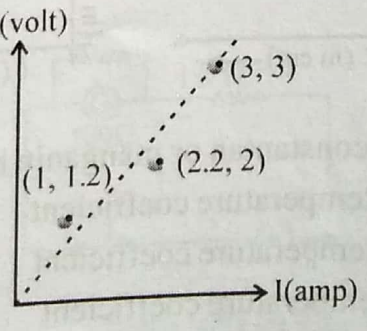
(A) $x > 54$ (B) $54 > x > 36$ (C) $36 > x > 18$ (D) $18 > x$

30. Variation of current passing through a conductor as the voltage supplied across its ends as varied is shown in the adjoining diagram. If the resistance (R) is determined at the points A, B, C and D we will find that -



(A) $R_C = R_D$ (B) $R_B > R_A$ (C) $R_C > R_B$ (D) $R_A > R_C$

31. In the measurement of resistance of a wire using Ohm's law, the plot between V and I is drawn as shown. The resistance of the wire is -



(A) 0.833 Ω (B) 0.9 Ω (C) 1 Ω (D) None of these