PHYSICS

FOR IIT JEE ASPIRANTS OF CLASS 12 FOR PHYSICS

EXPERIMENTAL PHYSICS

Exercise

1. The zero error in a Vernier callipers is said to be positive when

A. zero of vernier scale is towards the right of the zero of main scale

B. zero of vernier scale coincides with the zero of main scale

C. zero of vernier scale is towards the left of the zero of main scale

D. the vernier scale is not visible clearly.

Answer: A

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2. Depth of a cylindrical vessel can be measured by using Vernier Callipers by the help of

A. thin metallic strip projecting at the back

B. the lower pair of jaws

C. the upper pair of jaws

D. both lower and upper pairs of jaws

Answer: A

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3. Using upper pair of jaws of Vernier Callipers, we can measure

A. the depth of a cylindrical vessel

B. the outer diameter of a vessel

C. the inner diameter of a vessel

D. the thickness of a thin wire

Answer: C

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4. The Vernier constant of a Vernier Callipers is

A. the difference between one main scale division and one Vernier scale division

B. the sum of one main scale division and one Vernier scale division

C. the ratio of one main scale division to one Vernier scale division

D. the product of one main scale division and one vernier scale division

Answer: A

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5. The zero error in a Vernier callipers is said to be negative when

A. zero of Vernier scale is towards the right of the zero of main scale

B. zero of Vernier scale coincides with the zero of main scale

C. zero of Vernier scale is towards left of the zero of main scale

D. the vernier scale is not visible clearly.

Answer: C

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6. The vernier constant of a Vernier Callipers A and B are $0.01 cm$ and $0.01 mm$ respectively. The one which can measure the length of a small cylinder more accurately is

A. A

B. B

C. Both A and B with same accuracy

D. accuracy does not depend on vernier constant

Answer: B

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7. Each division on the main scale is $1mm$. Which of the following vernier scales give vernier constant equal to $0.01mm$?

A. $99mm$ divided into 100 divisions

B. $9mm$ divided into 10 divisions

C. $90mm$ divided into 100 divisions

D. $9mm$ divided into 100 divisions

Answer: A

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8. A vernier callipers has 20 divisions on the vernier scale which coincides with $19mm$ on the main scale. Its least count is

A. $0.5mm$

B. $1mm$

C. $0.05mm$

D. $\frac{1}{4}mm$

Answer: C

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9. Least count of a vernier callipers is $0.01cm$. Using this, the diameter of a sphere is measured as $1.95cm$. Radius of the sphere to the correct significant figure will be

A. $0.98cm$

B. $0.975cm$

C. $1.0cm$

D. $1cm$

Answer: A

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10. The main scale of vernier callipers is divided into $0.5mm$ and its least count is $0.005cm$. Then the number of divisions on vernier scale is

A. 10

B. 20

C. 30

D. 40

Answer: A

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11. The side of a cube is measured by vernier callipers (10 divisions of a vernier scale coincide with 9 divisions of main scale, where 1 division of main scale is $1mm$). The main scale reads $10mm$ and first division of vernier scale coincides with the main scale. Mass of the cube is $2.736g$. find the density of the cube in appropriate significant figures.

A. $1.33gcm^{-3}$

B. $2.66gcm^{-3}$

C. $2.667gcm^{-3}$

D. $2.5gcm^{-3}$

Answer: B

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12. (A) Vernier callipers with 20 divisions on sliding scale, coinciding with 19 main scale divisions

(B) A screw gauge of pitch $1mm$ and 100 divisons on the circular scale

(C) An optical instrument that can measure length to within a wavelength of light Out of A, B and C the most precise devide for measuring length is

A. A only

B. B only

C. C only

D. All are equally accurate

Answer: C

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13. If n^{th} division of main scale coincides with $(n+1)^{th}$ divisions of vernier scale. Given one main scale division is equal to 'a' units. Find the least count of the vernier.

A. $\dfrac{n}{a+1}$

B. $\dfrac{a}{n+1}$

C. an

D. $\dfrac{a}{n}$

Answer: B

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14. The vernier scale of a travelling microscope has 50 division which coincide with 49 main scale division. If each main scale division is 0.5 mm, calculate the minimum inaccuracy in the measurement of distance.

A. $0.1mm$

B. $0.001mm$

C. $0.01mm$

D. $1mm$

Answer: C

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15. The vernier constant of a vernier callipers is $0.1mm$ and it has a positive zero error of $0.04cm$. While measuring diameter of a rod, the main scale reading is $1.2cm$ and $5th$ vernier division is coinciding with any scale division. The correct diameter of the rod is

A. $1.21cm$

B. $1.21mm$

C. $1.29mm$

D. $1.29cm$

Answer: A

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16. When the two jaws of a vernier callipers are in touch, zero of vernier scale lies to the right of zero of main scale and coinciding with vernier division 3. If vernier constant is $0.1mm$, the zero correction is

A. $-0.03cm$

B. $+0.03cm$

C. $-0.03mm$

D. $+0.03mm$

Answer: A

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17. You are given two different vernier callipers A and B haiving 10 divisions on vernier scale that coincide with 9 divisions on the main scale each. If $1cm$ of main scale A is divided into 10 parts and that of B in 20 parts, then least count of A and B are

A. $0.001cm$ and $0.005cm$

B. $0.01cm$ and $0.05cm$

C. $0.01cm$ and $0.005cm$

D. $0.01cm$ and $0.001cm$

Answer: C

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18. For measuring depth of a beaker using vernier callipers. Observed readings are given as

SNO	$MSR(cm)$	VSD
1	0.5	8
2	0.5	4
3	0.5	6

If zero error is $-0.03cm$, then mean corrected depth is

A. $0.56cm$

B. $0.59cm$

C. $0.53cm$

D. $0.52cm$

Answer: B

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19. The main scale of vernier callipers reads in millimetre and its vernier is divided into 10 divisions which coincide with 9 divisions of the main scale. When there is nothing between the jaws of the vernier callipers, the $7th$ divisions of vernier scale coincides with a division of main scale and in this case zero of vernier scale is lying on right side of the zero of main scale. When a cylinder is tigthly placed along its length between the jaws, the zero of the vernier scale is slightly left to be $3.1cm$ and $4thVSD$ coincides with a scale division. The length of the cylinder is

A. $3.2cm$

B. $3.07cm$

C. $3.21cm$

D. $2.99cm$

Answer: B

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20. In a vernier callipers, smallest division on the main scale is $1mm$, while the vernier scale have 20 divisions. When fixed jaw touches with movable jaw, zero of vernier scale lies on the right of the zero of the main scale and $15th$ division of vernier scale coincides with any division of main scale. What is the type of zero error and its value?

A. positive, $0.75mm$

B. negative, $0.75mm$

C. positive, $0.15mm$

D. negative, $0.15mm$

Answer: A

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21. A vernier callipers used by student has 20 divisions in $1cm$ on main scale. 10 vernier divisions coincide with 9 main scale divisions. When jaws are closed, zero of main scale is on left of zero of vernier scale and $6th$ divisions of vernier scale coincides with any mains scale divisions. He placed a wooden cylinder in between the jaws and measure the length. The zero of vernier scale is on right of $3.2cm$ mark of main division and $8th$ division of vernier scale with any main scale division. When he measures diameter of cylinder he finds that zero of vernier scale lies on right of $1.5cm$ mark of main scale and $6th$ division of vernier scale coincides with any main scale division.

Least count and zero error of vernier callipers are

A. $0.05cm, +0.3cm$

B. $0.05mm, -0.3mm$

C. $0.005cm, +0.03cm$

D. $0.05cm, -0.3cm$

Answer: C

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22. A vernier callipers used by student has 20 divisions in $1cm$ on main scale. 10 vernier divisions coincide with

9 main scale divisions. When jaws are closed, zero of main scale is on left of zero of vernier scale and $6th$ divisions of vernier scale coincides with any mains scale divisions. He placed a wooden cylinder in between the jaws and measure the length. The zero of vernier scale is on right of $3.2cm$ mark of main division and $8th$ division of vernier scale with any main scale division. When he measures diameter of cylinder he finds that zero of vernier scale lies on right of $1.5cm$ mark of main scale and $6th$ division of vernier scale coincides with any main scale division.

Correct values of measured length and diameter are

A. $3.27cm, 1.5cm$

B. $3.21cm, 1.5cm$

C. $3.27cm, 1.56cm$

D. none of these

Answer: B

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23. In a vernier callipers, N divisions of the main scale coincide with $N+m$ divisions of the vernier scale. what is the value of m for which the instrument has minimum least count.

A. 1

B. N

C. $\frac{N}{10}$

D. $\frac{N}{2}$

Answer: A

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24. $1cm$ on the main scale of a vernier callipers is divided into $10 equal$ parts. If 10 divisions of vernier coincide with 8 small divisions of main scale, then the least count of the calliper is.

A. $0.01cm$

B. $0.02cm$

C. $0.05cm$

D. $0.005cm$

Answer: B

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25. The vernier constant of a vernier callipers is $0.001cm$. If 49 main scale divisions coincide with 50 vernier scale devisions, then the value of 1 main scale divisions is .

A. $0.1mm$

B. $0.5mm$

C. $0.4mm$

D. $1mm$

Answer: B

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26. $1cm$ of main scale of a vernier callipers is divided into 10 divisions. The least count of the callipers is $0.05cm$, then the varnier scale must have

A. 10 divisions

B. 20 divisions

C. 25 divisions

D. 50 divisions

Answer: B

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27. A spectrometer gives the following reading when used to measure the angle of a prism.

Main scale reading : $58.5 degree$

Vernier scale reading : 09 divisions

Given that 1 division on main scale correspods to 0.5 degree. Total divisions on the vernier scale is 30 and match with 29 divisions of the main scale. the angle of the prism from the above data:

A. 58.59°

B. 58.77°

C. 58.65°

D. 59°

Answer: C

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28. A student measured the length of a rod and wrote it as $3.50cm$. Which insturment did he use to measure it?

A. A screw gauge having 100 divisions in the circular scale and pitch as $1mm$

B. A screw gauge having 50 divisions in the circular scale and pitch as $1mm$

C. A metre scale

D. A vernier callipers where the 10 divisions in vernier scale matches with 9 divisions in main scale and main scale has 10 divisions in $1cm$.

Answer: D

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29. A vernier calipers has $1mm$marks on the main scale. It has 20 equal divisions on the Verier scale which match with 16 main scale divisions. For this Vernier calipers, the least count is

A. $0.2mm$

B. $0.05mm$

C. $0.1mm$

D. $0.2mm$

Answer: D

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30. The least count of vernier callipers is $0.1mm$. The main scale reading before the zero of the vernier scale is 10 and the zeroth division of the vernier scale coincides with the main scale division. Given that each main scale division is $1mm$. The measured value should be expressed as

A. $1cm$

B. $2cm$

C. $0.5cm$

D. $0.1cm$

Answer: A

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31. An experment is performed to find the refractive index of glass using a travelling mircroscope. In this experiment distances are measured by

A. a vernier scale provided on the microscope

B. a standard laboratory scale

C. a metre scale provided on the microscope

D. a screw gauge provided on the microscope

Answer: A

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32. In a screw gauge, the main scale has divisions in millimetre and circular scale has 50 divisions. The least count of screw gauge is

A. 2 microns

B. 5 microns

C. 20 microns

D. 50 microns

Answer: C

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33. The diameter of a wire is measured with a screw gauge having least count $0.01 mm$. Out of the following the one which correctly expresses its diameter is

A. $2.00 mm$

B. $0.2 mm$

C. $0.02 mm$

D. $0.002 mm$

Answer: A

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34. A screw gauge has $1.0mm$ pitch and 200 divisions on the ciruclar scale. The least count of the instrument is

A. $5 \times 10^{-3} mm$

B. $5 \times 10^{-4} mm$

C. $5 \times 10^{-2} mm$

D. $5 \times 10^{-5} mm$

Answer: A

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35. In a screw gauge, keeping pitch of the screw constant, if we increase the number of head scale divisions, then its accuracy of measurement

A. increases

B. decreases

C. does not change

D. cannot be predicted

Answer: D

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36. Out of the following three devices, the one which is more accurate to measure length is

(i) a meter rod

(ii) a vernier callipers with least count $0.01 cm$

(iii) a screw gauge with a pitch $0.5 mm$ having number of divisions on the circular scale as 100

A. (i)

B. (ii)

C. (iii)

D. all the three are equally accurate.

Answer: C

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37. Pitch of the screw gauge is $0.5mm$. Its head scale contains 50 divisions. The least count of it is

A. $0.01mm$

B. $0.1mm$

C. $0.25mm$

D. $0.02mm$

Answer: A

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38. Without changing the number of divisions on the circular scale, if the pitch of the screw gauge is halved, then its accuracy of measurement

A. decreases

B. increases

C. remains unaffected

D. increases or decreases depending on the weight.

Answer: B

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39. The least count of a screw gauge is $0.005 mm$ and it has 100 equal divisions on its head scale. Then the distance between two consecutive threads on its screw is

A. $0.5 mm$

B. $0.05 mm$

C. $0.01 mm$

D. $0.1 mm$

Answer: A

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40. The diameter of a wire is measured by using a screw gauge having least count $0.01mm$. If the diameter is found to be $0.20mm$, then the error in the cross-section of the wire will be

A. $5\ \%$

B. $10\ \%$

C. $1\ \%$

D. $2.5\ \%$

Answer: B

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41. The least count of screw gauge is $\frac{1}{100}mm$ and the pitch of the screw is $1mm$. The maximum percentage error of the instrument is

A. 5%

B. 2%

C. 1%

D. 10%

Answer: C

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42. The radius of a ball bearing measured by a screw gauge is $3.75mm$. The pitch of the screw is $1mm$ and it has 100 divisions on its head scale. The percentage error in the volume of the ball bearing which is perfectly spherical by shape is

A. $2\ \%$

B. $1.5\ \%$

C. $0.8\ \%$

D. $1\ \%$

Answer: C

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43. The length, breadth and thickness of a small uniform rectangular glass strip are $4.25 cm$, $6.25 mm$ and $2.75 mm$. Its length is measured by vernier callipers of least count $0.01 cm$ and breadth and thickness were measured by screw gauge having least count $0.01 mm$. The percentage error in the measurement of volume of the strip is

A. $0.76\ \%$

B. $1.36\ \%$

C. $2.13\ \%$

D. $1.76\ \%$

Answer: A

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44. Length of a thin cylinder as measured by vernier callipers having least count $0.01 cm$ is $3.25 cm$ and its radius of cross-section is measured by a screw gauge having least count $0.01 mm$ as $2.75 mm$. The percentage error in the measurement of volume of the cylinder will be

A. 2%

B. 3%

C. 1%

D. 1.5%

Answer: C

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45. When circular scale of a srew gauge carrying 100 divisions is given four complete rotations, the head of the screw moves through $2mm$. The pitch and least count of screw gauge are respectively.

A. $1mm$ and $0.005mm$

B. $0.5mm$ and $0.001mm$

C. $0.5mm$ and $0.005mm$

D. $0.005mm$ and $0.005mm$

Answer: C

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46. A student measured the diameter of a wire using a screw gauge with least count $0.001 cm$ and listed the measurement. The correct measurement is

A. $5.3 cm$

B. $5.32 cm$

C. $5.320 cm$

D. $5.3200 cm$

Answer: C

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47. A screw gauge having 100 equal division and a pitch of length $1mm$ is used to measue the diameter of a wire of length $5.6cm$. The main scale reading is $1mm$ and 47^{th} circular division coincides with the scale. Find the curved surface area of wire in cm^2 to appropriate significant fihure.

$$\left(use\pi = \frac{22}{7}\right.$$

A. $2.6cm^2$

B. $2.587cm^2$

C. $2.58cm^2$

D. $2.5872cm^2$

Answer: A

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48. Two full turns of the circular scale of a screw gauge cover a distance of $1mm$ on its main scale. The total number of divisions on the circular scale is 50. Further, it is found that the screw gauge has a zero error of $-0.03mm$. While main scale reading of $3mm$ and the number of circular scale divisions in line with the main scale as 35. the dimeter of the wire is

A. $3.32mm$

B. $3.73mm$

C. $3.67mm$

D. $3.38mm$

Answer: D

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49. The density of a solid ball is to be determined in an experiment. The diameter of the ball is measured with a screw gauge, whose pitch is $0.5mm$ and there are 50 divisions on the circular scale. The reading on the main scale is $2.5mm$ and that on circular scale is 20 divisions. if the measured mass of the ball has a relative error of 2%, the relative percentage error in the density is

A. 0.9%

B. 2.4%

C. 3.1%

D. 4.2%

Answer: C

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50. A screw gauge gives the following reading when used to measure the diameter of a wire. Main scale reading $= 0mm$, circular scale reading $= 52$ divisions. Given that $1mm$ on main scale corresponds to 100 divisions of the circular scale. The diameter of the wire from the above data is

A. $0.052cm$

B. $0.026cm$

C. $0.005cm$

D. $0.52cm$

Answer: A

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51. The circular scale of a screw gauge has 200 divisions. When it is given 4 complete rotations, it moves through $2mm$. The least count of the screw gauge is

A. $0.25 \times 10^{-2} cm$

B. $0.25 \times 10^{-3} cm$

C. $0.001 cm$

D. $0.001 mm$

Answer: B

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52. While measuring diameter of a wire using a screw gauge the main scale reading is $7mm$ and zero of circular scale is 35 divisions above the reference line. If the screw gauge has a zero error of $-0.003cm$, the correct diameter of the wire is (given least count $= 0.001cm$)

A. $0.735cm$

B. $0.732cm$

C. $0.738cm$

D. $7.38cm$

Answer: C

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53. When a screw gauge is completely closed, zero of circular scale is 6 divisions below the reference line of graduation. If least count of screw gauge is $0.001cm$, the zero correction is

A. $-0.006cm$

B. $+0.006cm$

C. $-0.006mm$

D. $+0.006mm$

Answer: A

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54. For the given figure, calculate zero correction

A. $-0.02mm$

B. $+0.02mm$

C. $-0.03mm$

D. $+0.03mm$

Answer: C

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55. The pitch of a screw gauge is $0.5mm$ and there are 50 divisions on circular scale. When there is nothing between the two ends (studs) of screw gauge, $45th$ division of circular scale is coincide with screw guage, and in this situation zero of main scale is not visible. When a wire is place between the studs, the linear scale reads 2 divisions and $20th$ divisions of circular scale coincides with references line. For this situation mark the correct statement(s).

A. Least count of the instrument is $0.01mm$

B. Zero correction for the instruement is $+0.45mm$

C. Thickness of wire is $1.65mm$

D. All of the above

Answer: D

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56. In a screw guage, the value of one division on the linear scale is $1mm$, while the circular scale have 100 divisions. Without any object for measurement, while the screw touches the stud, the zero on circular scale advances 27 divisions beyond the references line. What is the type and amount of zero error?

A. positive, $0.0.27mm$

B. negative, $0.27mm$

C. positive, $0.27mm$

D. negative, $0.027mm$

Answer: B

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57. When a screw gauge is completely closed, zero of circular scale is 7 divisions above the reference line of graduation. If LC of screw gauge is $10^{-3} cm$, the zero error is

A. $-7 \times 10^{-3} cm$

B. $+7 \times 10^{-3} cm$

C. $-0.007 mm$

D. $+0.007 mm$

Answer: A

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58. A screw gauge gives the following reading when used to measure the diameter of a wire. Main scale reading $= 0mm$, circular scale reading $= 52$ divisions. Given that $1mm$ on main scale corresponds to 100 divisions of the circular scale. The diameter of the wire from the above data is

A. $0.052cm$

B. $0.026cm$

C. $0.005cm$

D. $0.52cm$

Answer: A

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59. If in a screw gauge, zero mark of the circular scale remains on right of reference line and does not cross it and $2nd$ division on circular scale comes on references line. Then zero correction is

A. $+0.02mm$

B. $-0.02mm$

C. $+0.002mm$

D. $-0.002mm$

Answer: B

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60. On measuring diameter of a wire with help of screw gauge, main scale reading is $1mm$ and $6th$ division of circular scale lying very reference line. On measuring zero error, it is found that zero of circular scale has advanced from references line by 3 divisions on circular scale, then corrected diameter is

A. $1.09mm$

B. $1.06mm$

C. $1.03mm$

D. $1.60mm$

Answer: A

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61. A screw gauge with a pitch of $0.5mm$ and a circular scale with 50 divisions is used to measure the thicknes of a thin sheet of Aluminium. Before starting the measurement, it is found that wen the jaws of the screw gauge are brought in cintact, the 45^{th} division coincide with the main scale line and the zero of the main scale is barely visible. what is the thickness of the sheet if the main scale readind is $0.5mm$ and the $25th$ division coincide with the main scale line?

A. $0.75mm$

B. $0.80mm$

C. $0.70mm$

D. $0.50mm$

Answer: B

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62. The necessary and sufficient condition for simple harmonic motion is

A. Constant period

B. Constant acceleration

C. Proportionality between restoring force and displacement from equilibrium position

D. Acceleration is inversely proportional to displacement from equilibrium position

Answer: C

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63. The work done by the string of a simple pendulum during one complete oscillation is

A. equal to the total energy of the pendulum

B. equal to the kinetic energy of the pendulum

C. equal to the potential energy of the pendulum

D. zero

Answer: D

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64. In case of a forced vibration the resonance wave becomes very sharp when the

A. damping force is small

B. restoring force is small

C. applied periodic force is small

D. quality factor is small

Answer: A

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65. The one which is not the cause of damping of an oscillating simple pendulum

A. Friction due to two halves of split cork used to suspend the simple pendulum

B. air currents due to the use of a fan

C. Opening of doors and windows of the room

D. Closing of doors and windows of the room

Answer: D

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66. The time period of an oscillating simple pendulum is $1s$ when its amplitude of vibration is $4cm$. Its time period when its amplitude is $6cm$ is

A. $\frac{3}{2}s$

B. $\frac{2}{3}s$

C. $4s$

D. $1s$

Answer: D

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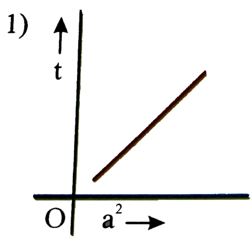
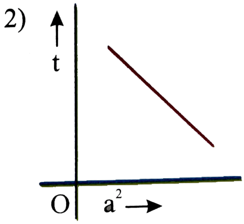
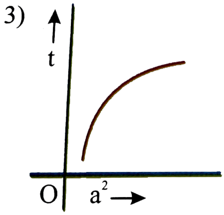
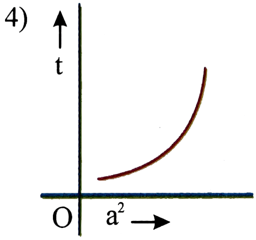
67. The graph between square of amplitude and time clapsed is

A. 

B. 

C. 

D. 

Answer: B

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68. A simple pendulum is oscillating in a stationery lift. When the lift falls freely, the frequency of oscillations of the pendulum is

A. zero

B. infinity

C. unaltered

D. negative

Answer: A

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69. A simple pendulum suspended from the ceiling of a trans has a time period T when the train is at rest. If the train is accelerating uniformly at a then its time period

A. increases

B. decreases

C. unaltered

D. becomes infinity

Answer: B

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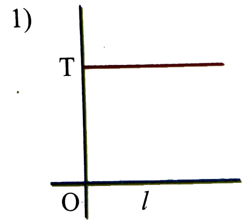
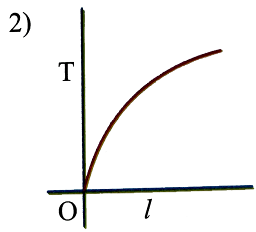
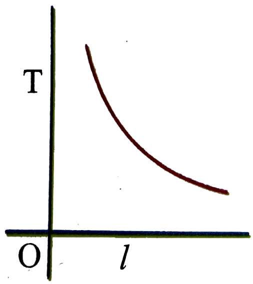
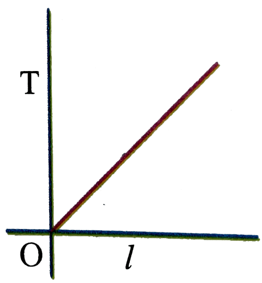
70. The graph between time period (T) and length (l) of a simple pendulum is

A. 

B. 

C. 

D. 

Answer: B

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71. The time period of a simple pendulum inside a stationery lift is T. If the lift accelerates upwards uniformly with $\frac{g}{4}$, then its time period would be

A. $2\sqrt{5}T$

B. $\frac{2T}{\sqrt{5}}$

C. $2T$

D. $\frac{T}{2}$

Answer: B

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72. The period of oscillation of a simple pendulum is given by $T = 2\pi\sqrt{\frac{l}{g}}$ where l is about 100 cm and is known to have 1 mm accuracy. The period is about 2 s. The time of 100 oscillation is measrued by a stop watch of least count 0.1 s. The percentage error is g is

A. 0.4%

B. 0.1%

C. 0.3%

D. 0.2%

Answer: D

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73. The bob of a simple pendulum is a spherical hollow ball filled with water. A plugged hole near the bottom of the oscillating bob gets suddenly unplugged. During observation, till water is coming out, the time period of lscillation would.

A. first increases and then decreases to its original value

B. first decreases and then increases to its original value

C. remains unchanged

D. increases gradually to infinity.

Answer: A

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74. A particle executes simple harmonic motion. Then the graph of veloctiy as a function of its displacement is

A. a straight line

B. a circle

C. an ellipse

D. a hyperbola

Answer: C

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75. The graph plotted between acceleration and displacement of a particle in SHM is

A. a straight line

B. a circle

C. an ellipse

D. a hyperbola

Answer: A

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76. For an oscillating simple pendulum, is the tension in the string constant throughout the oscillation? If not, when it is (a) the least, (b) the greatest?

A. a constant

B. maximum at extreme position

C. maximum while crossing the mean position of rest

D. zero at mean position

Answer: C

Watch Video Solution

77. The time period of a simple pendulum oscillating in a freely falling lift is

A. infinity

B. zero

C. negative

D. 2 sec.

Answer: A

Watch Video Solution

78. A particle executes SHM.

(a) What fraction of total energy is kinetic and what fraction is potential when displacement is one half of the amplitude?

(b) At what value of displacement are the kinetic and potential energies equal?

A. $\frac{1}{4}$

B. $\frac{2}{3}$

C. $\frac{4}{5}$

D. $\frac{3}{4}$

Answer: D

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79. The potential energy of a particle of mass $1kg$ in motion along the x- axis is given by: $U = 4(1 - \cos 2x)$, where x in meters. The period of small oscillation (in sec) is

A. π

B. $\frac{\pi}{2}$

C. $\frac{3\pi}{2}$

D. 2π

Answer: B

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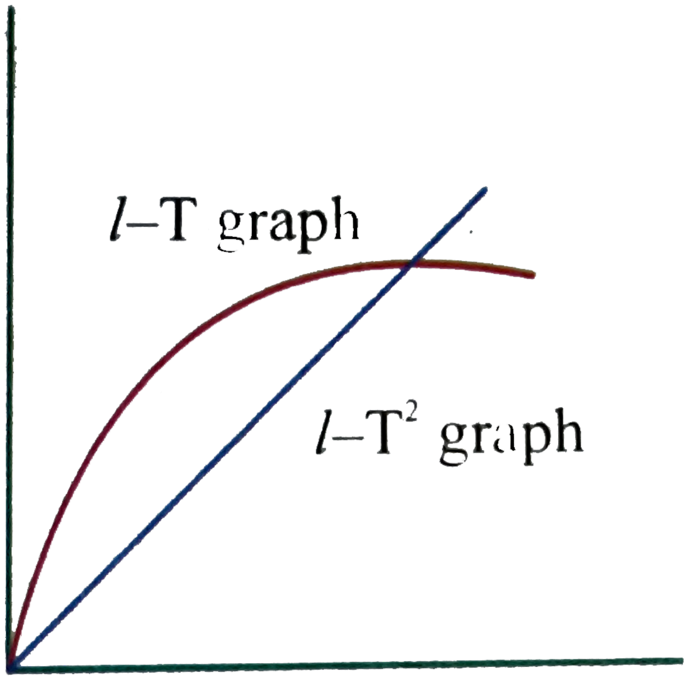
80. If the time period of a pendulum is $1 \sec$, then what is the length of the pendulum at point of intersection of $l - T$ and $l - T^2$ graph.



A. $25 cm$

B. $21cm$

C. $22cm$

D. $27cm$

Answer: A

Watch Video Solution

81. The period of oscillation of a simple pendulum is $T = 2\pi\sqrt{\frac{L}{g}}$. Meaured value of L is $20.0cm$ know to $1mm$ accuracy and time for 100 oscillation of the pendulum is found to be $90s$ using a wrist watch of $1s$ resolution. The accracy in the determinetion of g is :

A. 1%

B. 5%

C. 2%

D. 3%

Answer: D

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82. A metre stick is balanced on a knife edge at its centre. When two coins, each of mass $5g$ are put one on of the other at the $12cm$ mark, the stick is found to balanced at $45cm$. The mass of the metre stick is.

A. $100g$

B. $33g$

C. $66g$

D. $99g$

Answer: C

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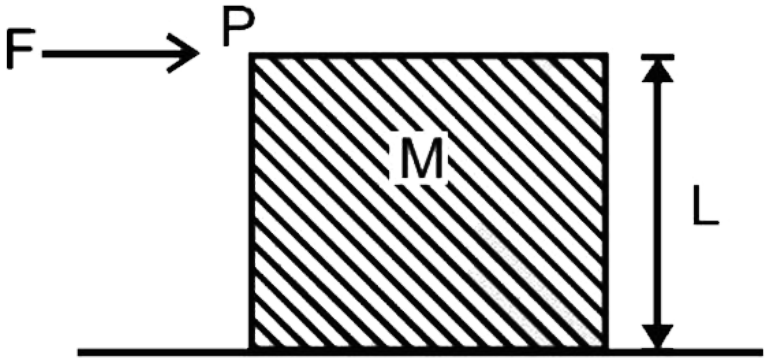
83. A cubical block of side L rests on a rough horizonta surface with coefficient of friction μ. A horizontal force F is applied on the block as shown. If the coefficient of friction is sufficiently high so that the block does not slide before toppling, the minimum force required to topple the block is



A. mg

B. $\frac{mg}{4}$

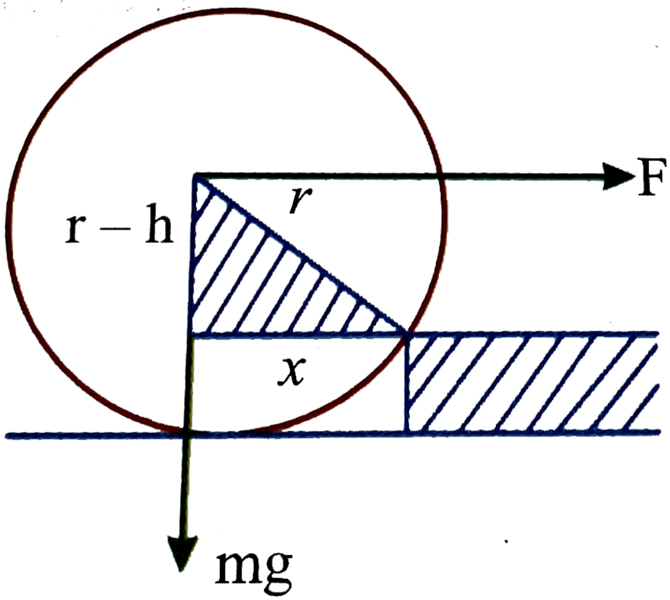
C. $\frac{mg}{2}$

D. $mg(1-\mu)$

Answer: C

Watch Video Solution

84. A wheel of radius r and mass m stands in front of a step of height h. The least horizontal force which should be applied to the axle of the wheel to allow it to raise onto the step is



A. $\dfrac{mgh(2r-h)}{r-h}$

B. $mgh(r-h)$

C. $\dfrac{mg\left(\sqrt{h(2r-h)}\right)}{r-h}$

D. $\dfrac{mgh}{r}$

Answer: C

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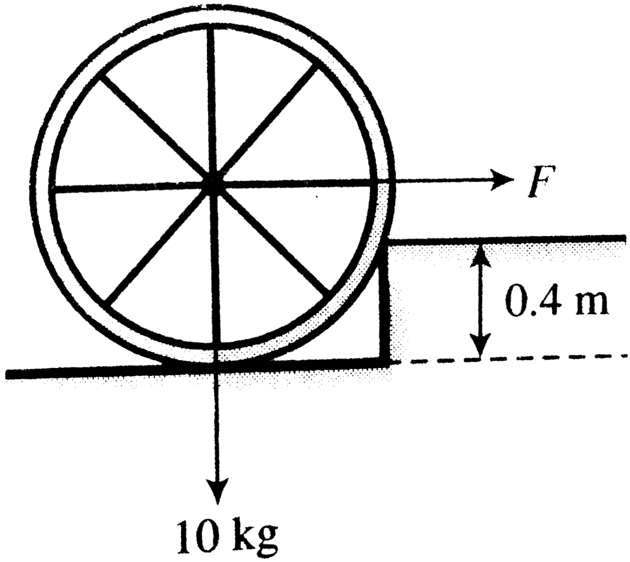
85. Calculate the force F that is applied horizontally at the axle of the wheel which is necessary to raise the wheel over the obstacle of height $0.4m$. Radius of wheel is $1m$ and $mass = 10kg$. F is



A. $100N$

B. $66N$

C. $167N$

D. $133.3N$

Answer: D

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86. Two men A and B are carrying a uniform bar of length L on their shoulders. The bar is held horizontally such that A gets one-fourth load. If A is at one end of the bar, the distance of B from that end is

A. $\frac{L}{3}$

B. $\frac{L}{2}$

C. $\frac{2L}{3}$

D. $\frac{3L}{4}$

Answer: C

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87. A balance is made of a rigid rod free to rotate about a point not at the centre of the rod. When an unknown mass m is placed in the left pan, it is balanced by a mass m_1 placed in the right pan and similarly when the mass m is placed in the right pan, it is balanced by a mass m_2 in the left pan. Neglecting the masses of the pans, m is

A. $\dfrac{m_1 + m_2}{2}$

B. $\sqrt{m_1 m_2}$

C. $\dfrac{\sqrt{m_1^2 + m_2^2}}{2}$

D. $\sqrt{\dfrac{(m_1^2 + m_2^2)}{2}}$

Answer: B

Watch Video Solution

88. A flase balance has equal arms. An object weights W_1 when placed in one pan and W_2 when placed in the other pan. The true weight W of the object is.

A. $\sqrt{xy}$

B. $\dfrac{x+y}{2}$

C. $\dfrac{x^2+y^2}{2}$

D. $\dfrac{\sqrt{x^2+y^2}}{2}$

Answer: B

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89. A weightless ladder $6m$ long rests against a frictionless wall at an angle of 60° from the horizontal. A $60kg$ man standing on it is $2m$ from the top of the ladder. A horizontal force is applied at the lower end to keep it from slipping. The magnitude of the force is

A. $\frac{10}{\sqrt{3}}N$

B. $\frac{20}{\sqrt{3}}N$

C. $\frac{\sqrt{3}}{20}N$

D. $20\sqrt{3}N$

Answer: B

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90. An uniform metre scale of weight $50g$ is balanced at $60cm$ mark, when a weight of $15g$ is suspended at $10cm$ mark. Where must a weight $100g$ be suspended to balance metre scale.

A. $72.5cm$

B. $70cm$

C. $71.5cm$

D. $74.5cm$

Answer: A

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91. A load of $3kg$ produces an extension of $1.5mm$ in a wire of length $3m$ and diameter $2mm$. Young's modulus of the material of the wire is

A. $1.87 \times 10^{10} Nm^{-2}$

B. $3.5 \times 10^{10} Nm^{-2}$

C. $15 \times 10^{10} Nm^{-2}$

D. $2.5 \times 10^{10} Nm^{-2}$

Answer: A

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92. The force required to stretch a steel wire $1cm^2$ in cross - section to increase its length by 1%,if its Young's modulus is $2 \times 10^{11} Nm^{-2}$,is

A. $10^5 N$

B. $3 \times 10^5 N$

C. $2 \times 10^5 N$

D. $4 \times 10^5 N$

Answer: C

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93. A wire is made of a material of density $10g/cm^3$ and breaking stress $5 \times 10^9 Nm^{-2}$. If `g = 10ms^(-2) the length of the wire that will break under its own weight when suspended vertically is

A. $5 \times 10^2 m$

B. $5 \times 10^3 m$

C. $5 \times 10^4 m$

D. $5 \times 10^5 m$

Answer: C

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94. Two steel wires of lenths $1m$ and $2m$ have diameters $1mm$ and $2mm$ respectively. If they are stretched by forces of $40N$ and $80N$ respectively, the ratio of their elongations is

A. $2:1$

B. $2:3$

C. $3:4$

D. $1:1$

Answer: D

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95. What is the value of Young's modulus for a perfectly rigid body?

A. zero

B. 1

C. infinite

D. negative

Answer: C

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96. If 'S' is stress and 'Y' is young's modulus of material of a wire, the energy stored in the wire per unit volume is

A. $\frac{2X}{Y}$

B. $\frac{Y^2}{2X}$

C. $\frac{X^2Y}{2}$

D. $\frac{X^2}{2Y}$

Answer: D

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97. The maximum load that a wire can sustain is W. If the wire is cut to half its value, the maximum load it can sustain is

A. $\frac{W}{4}$

B. $\frac{W}{2}$

C. W

D. $2(W)$

Answer: C

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98. A steel ring of radius r and cross section area A is fitted on to a wooden disc of radius $R(R > r)$. If Young's modulus be R, then the force with which the steel ring is expanded is

A. $\dfrac{AYR}{r}$

B. $\dfrac{AY(R-r)}{r}$

C. $\dfrac{Y}{A}\left[\dfrac{R-r}{r}\right]$

D. $\dfrac{Yr}{AR}$

Answer: B

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99. A metal beam supported at the two ends is loaded at the center .If $'Y'$ is Young 's modulus then the depression at the center is proportional to

A. $\frac{1}{Y}$

B. Y

C. $\frac{1}{(Y)^2}$

D. Y^2

Answer: A

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100. Hooke's law is applicable when intermolecular distance is

A. much smaller than the distance of equilibrium

B. approximately equal to the distance of equilibrium

C. much larger than the distance of equilibrium

D. zero

Answer: B

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101. The material which practically does not exhibit elastic after effect is

A. rubber

B. quartz

C. copper

D. steel

Answer: B

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102. A force F is needed to break a copper wire having radius R. The force needed to break a copper wire of same length and radius 2R will be

A. F

B. $2F$

C. $4F$

D. $\frac{F}{4}$

Answer: C

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103. When temperature of a material increases, its Young's modulus

A. increases

B. decreases

C. remains same

D. becomes infinity

Answer: B

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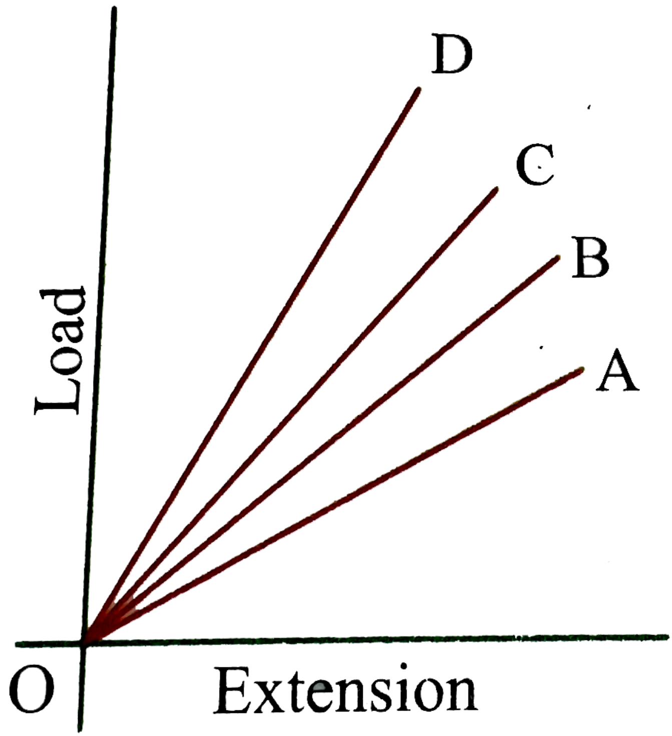
104. The load versus extension graph for four wires of same material is shown. The thinnest wire is represented by the line



A. OA

B. OB

C. OC

D. OD

Answer: A

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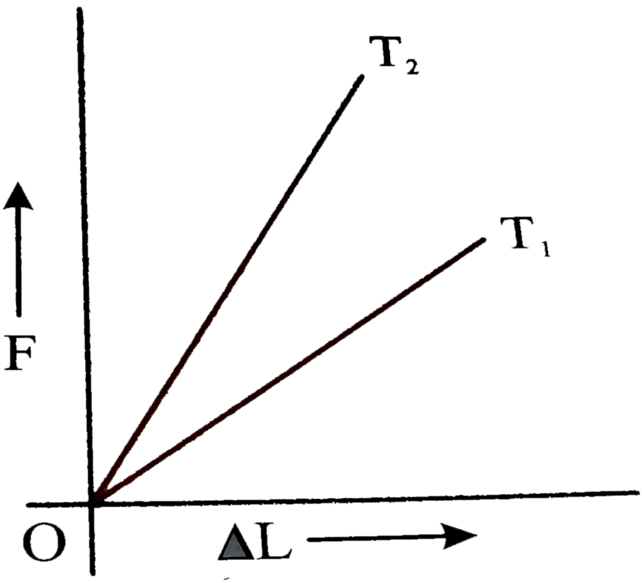
105. The graph shows the change $'\Delta l'$ in the length of a thin uniform wire used by the application of force F at different temperatures T_1 and T_2. The variation suggests that



A. $T_1 = T_2$

B. $T_1 > T_2$

C. $T_1 < T_2$

D. $T_1 \leq T_2$

Answer: B

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106. When the stress is increased beyond the elastic limit, the length of the wire starts increasing without increasing the force. This point is called

A. yield point

B. inverse point

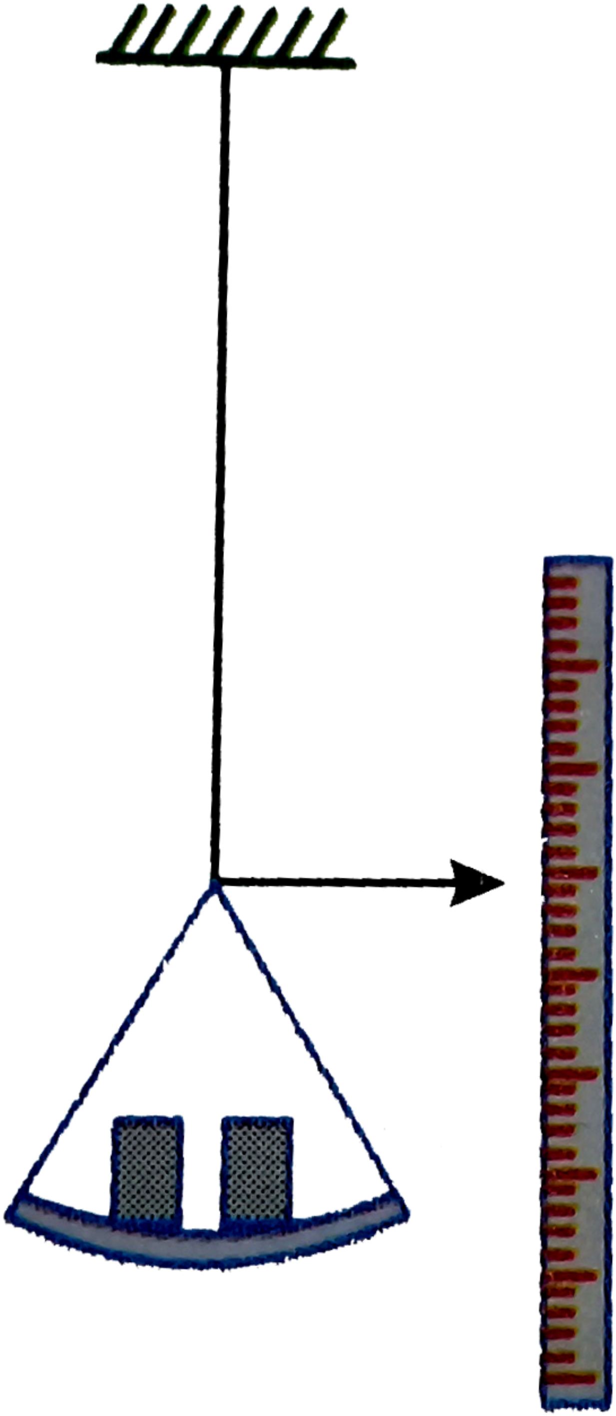
C. breaking point

D. triple point

Answer: A

Watch Video Solution

107. In the experiment to determine Young's modulus of the material of a wire under tension used in the arrangement as shown. The percentage error in the measurement of length is a in the measurement of the radius of the wire is b and in the measurement of the change in length of the wire is c. Percentage error in the measurement of Young's modulus for a given load is



A. $a - 2b + c$

B. $a - 2b - c$

C. $a + 2b + c$

D. $a + 2b$

Answer: C

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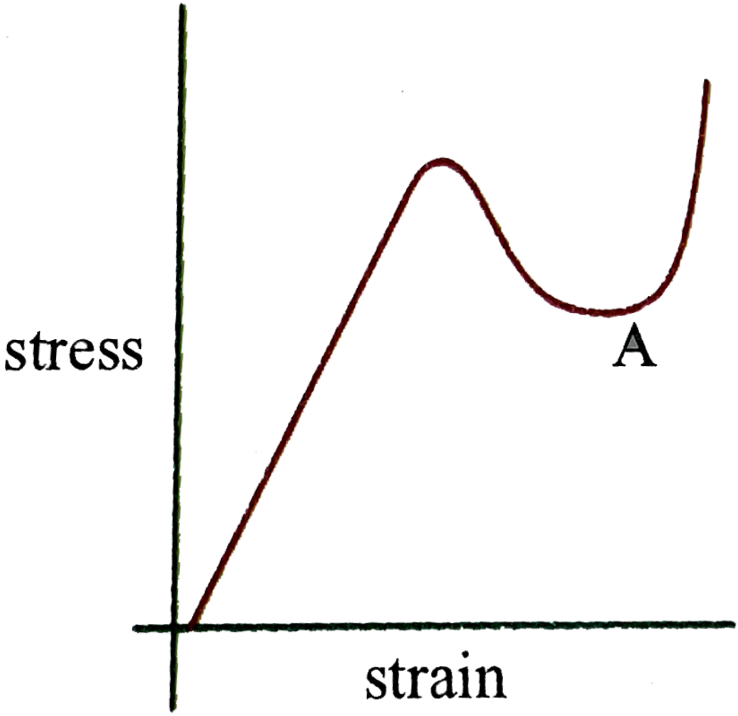
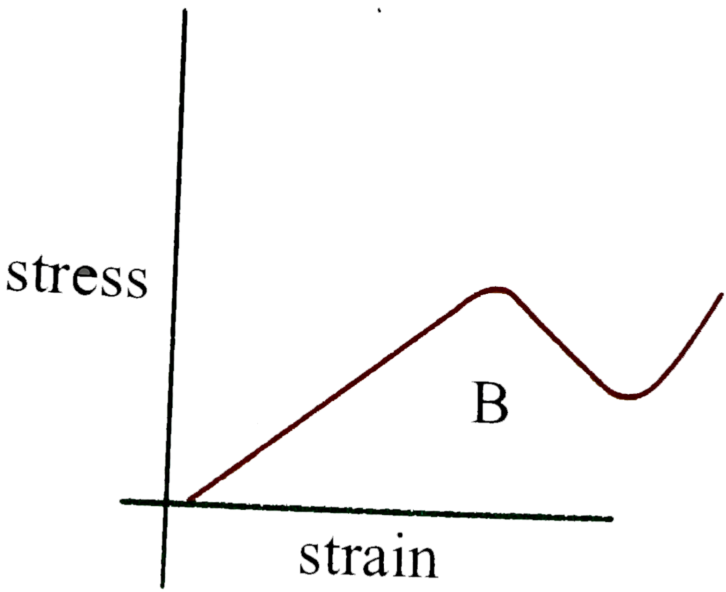
108. The stress- strain graphs for materials A and B are as shown. Choose the correct alternative


stress
A
strain


stress
B
strain

A. material A is stronger than material B

B. material B is stronger than material A

C. Young's modulus of A is greater than that of B

D. Young's modulus of B is greater than that of A

Answer: B::C

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109. A steel rod has a radius $10mm$ and a length of $1m$. A force stretches it along its length and produces a strain of 0.32%. Younng's modulus of steel is $2 \times 10^{11} Nm^{-2}$, the magnitude of force stretching the rod is

A. $100.5kN$

B. $201kN$

C. $78kN$

D. $150kN$

Answer: B

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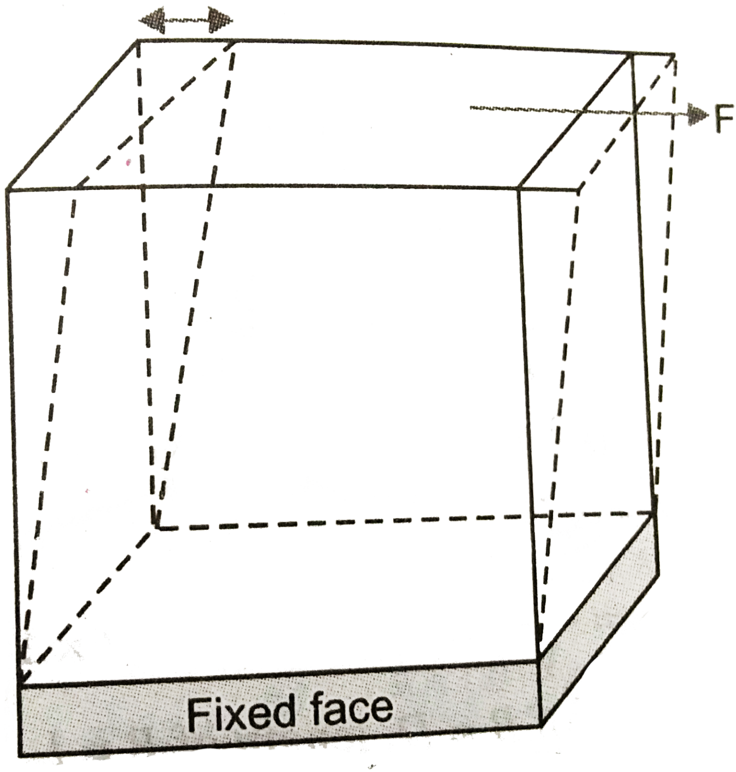
110. A square lead slab of side 50 cm and thickness 10 cm is subjected to a shearing force of $9.0 \times 10^4 N$. The lower edge of the slab is fixed to the floor. The upper edge of the slab is displaced by $0.16mm$. The Youn's modulus for the lead is



A. $1.9 \times 10^9 Nm^{-2}$

B. $1.7 \times 10^{10} Nm^{-2}$

C. $3.3 \times 10^{10} Nm^{-2}$

D. $5.6 \times 10^9 Nm^{-2}$

Answer: B

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111. Two wires of the same material have equal lengths but A is thicker than other B. Which of the two has greater value of Young's modulus?

A. A

B. B

C. same for A and B

D. cant perdict

Answer: C

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112. Maximum permissible load of given wire, if area of cross section $= \pi r^2$ and breaking stress is F is

A. $\frac{1}{3}F \times \pi r^2$

B. $\frac{1}{2}F \times \pi r^2$

C. $F\pi r^2$

D. $3F\pi r^2$

Answer: C

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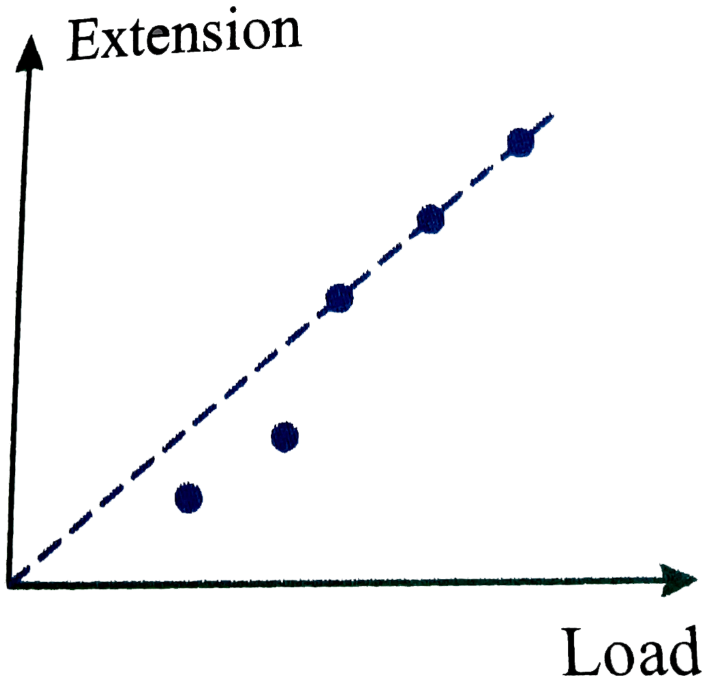
113. Statement-I: In Searle's experiment, extension versus load curve is drawn as shown. In the plot the first two readings are not lying on the straight line.



Statement-II : Experiment is performed incorrectly

A. Statement-I is true, Statement-II is true, Statement-II is a correct explanation for

Statement-I

B. Statement-I is false, Statement-II is true, Statement-II is not a correct explanation for Statement-I

C. Statement-I is true, Statement-II is flase

D. Statement-I is false, Statement-II is true

Answer: C

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114. Assertion (A): In searle's experiment, it is better to start the experiment with some initial load on the hanger.

Reason (R): In searle's experiment, it is desirable that wire is straight and no kinks are there.

A. both assertion and reason are true and the reason is the correct explanation of the assertion.

B. both assertion and reason are true but the reason is not the correct explanation of the assertion.

C. assertion is true but reason is false.

D. assertion is false but reason is true.

Answer: B

Watch Video Solution

115. A student performs an experiment to determine the Young's modulus of a wire, exactly$2m$ long, by Searle's method. In a partcular reading, the student measures the extension in the length of the wire to be $0.8mmwithanuncerta\int yof$+- 0.05mm $ataloadofexactly$1.0kg $, thestudentalsomeasuresthediameterofthewire \rightarrow be$ 04mm$withanuncerta\int yof$+-0.01mm. $Take$ g=9.8m//s^(2)` (exact). the Young's modulus obtained from the reading is

A. $(2.0 \pm 0.3) \times 10^{11} Nm^{-2}$

B. $(2.0 \pm 0.2) \times 10^{11} Nm^{-2}$

C. $(2.0 \pm 0.1) \times 10^{11} Nm^{-2}$

D. $(2.0 \pm 0.5) \times 10^{11} Nm^{-2}$

Answer: B

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116. Which of the following is wrong regarding Searle's apparatus method in finding Young's modulus of a given wire?

(a) Average elongation of wire will be determined with a particular load while increasing the load and decreasing the load.

(b) Reference wire will be just taut and experimental wire will undergo elongation.

(c) Air bubble in the spirit level will be disturbed from the central position due to relative displacement between the wires due to elongation.

(d) Average elongation of the wires is to be determined by increasing the load attached to both the wires.

A. Average elongation of wire will be determined with a particular load while increasing the load and decreasing the load.

B. Reference wire will be just taut and experimental wire will undergo for elongation.

C. Air bubble in the spirit level will be disturbed from the central position due to relative displacement between the wires due to elongation.

D. Average elongation of the wires is to be determined by increasing the load attached to both the wire.

Answer: D

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117. Two wires A and B have same lengths and made of the same material but A is thicker than B. Both are subjected to the same extending load. Which will extend more?

A. A

B. B

C. Same extension

D. cant perdict

Answer: B

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118. A thin $1m$ long rod has a radius of $5mm$. A force of $50\pi KN$ is applied at one end to determine its Young's modulus Assume that the force is exactly known. If the least count in the measurement of all lengths is $0.01mm$ which of the following statements is false ?

A. The maximum value of Y that can be determined is $10^{14} N/m^2$

B. $\frac{\Delta Y}{Y}$ gets minimum contribution from the unicertainity in the length

C. $\frac{\Delta Y}{Y}$ gets minimum contribution from the unicertainity in strain

D. The figure of merit is the largest for the length of the rod

Answer: A

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119. If a liquid used in capillary rise method for measuring surface tension whose surface tension is more than that of water, then rise in capillary tube

A. increases

B. decreases

C. remains same

D. we can't say

Answer: A

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120. What will happen to the rise in capillary tube if the double mass of detergent is added in same volume of water?

A. decreases

B. increases

C. remains same

D. we can't say

Answer: A

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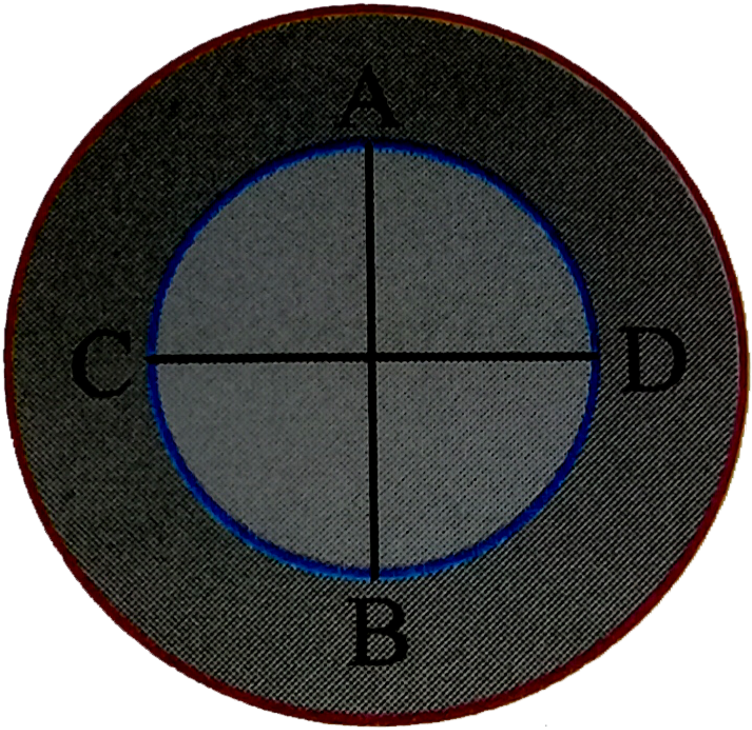
121. In experiment for measuring surface tension by capillary rise method, reading or positions A, B, C and D for internal diameter of capillary tube are given as under

$A(cm) = 1.006$

$B(cm) = 1.009$

$C(cm) = 1.004$

$D(cm) = 1.009$



Mean intenal radius of capillary is

A. $0.002cm$

B. $0.003cm$

C. $0.004cm$

D. $0.005cm$

Answer: A

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122. Consider two capillery tubes A and B with radii $r_i = r, r_2 = \frac{r}{2}$. In which case liquid rise more?

A. A

B. B

C. same level

D. data insufficent

Answer: B

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123. While measuring surface tension of water using capillary rise method, height of the lower meniscus from free surface of water is $3cm$ while inner radius of capillary tube is found to be $0.5cm$. Then compute surface tension of water using this data. (Take contact angle between glass and water as 0° and $g = 9.8lms^{-2}$)

A. $0.72Nm^{-1}$

B. $0.77Nm^{-1}$

C. $1.67Nm^{-1}$

D. $8.67Nm^{-1}$

Answer: B

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124. In previous question if we add some detergent to water, then

A. liquid level in capillary tube is less than $3cm$

B. liquid level in capillary tube is greater than $3cm$

C. liquid level in capillary tube is equal to $3cm$

D. anything may happen

Answer: A

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125. While measuring surface tension of water using capillary rise method the necessary precaution to be taken is//are

A. capillary tube should be clean while water should have some grease

B. both capillary tube and water should be clean

C. no need to take care of temperature of water

D. All of the above

Answer: B

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126. A capillary tube A is dipped in water. Another identical tube B is dipped in detergent-water solution. Which of the following shows the correct nature of meniscus of the liquid column in the two capillary tubes?

A. Both shows convex meniscus

B. Meniscus in both the cases are concave

C. InA, meniscus is concave while in B it is convex

D. InA, meniscus is convex while in B it is concave

Answer: B

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127. Find the depression of the miniscus in the capillary tube of diametre $0.4mm$ dipped in a beaker containning mercury (density of mercury $= 13.6 \times 10^3 kg/m^3$ and surface tension of the mercury is $0.49N/m$ and angle of contact is 135°).

A. $0.025cm$

B. $0.021cm$

C. $0.020cm$

D. $0.027cm$

Answer: A

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128. Terminal velocity is

A. the velocity of flow upto which the flow is streamlined

B. the velocity at the bottom of the container

C. the constant velocity of fall of a body through a viscous liquid

D. equal to escape velocity of a satellite

Answer: C

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129. Viscosity is a transport phenomenon explained using the concept of transfer of

A. mass

B. kinetic energy

C. potential energy

D. momentum

Answer: D

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130. When the temperature increases the viscosity of

A. increases & decreases

B. decreases & increases

C. increases & increases

D. decreases & decreases

Answer: B

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131. The viscous drag on a liquid layer does not depend on

A. nature of the liquid

B. velocity gradient

C. velocity

D. area

Answer: A

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132. Stoke's theorem is applicable only to

A. non-viscous liquids

B. viscous liquids

C. solutions

D. pure metals

Answer: B

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133. A steel ball falls slowly through water than through air because

A. there is no surface tension

B. density of air is low

C. upthrust of air is low

D. viscosity of air is low

Answer: D

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134. A liquid is flowing uniformly. The net external force causing the liquid to flow is

A. equal to viscous force

B. more than viscous force

C. less than viscous force

D. not related to viscous force

Answer: A

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135. Two steel balls of radii R_1 and $R_2(R_1 > R_2)$ are dropeed through a tube full of glcerine. Their terminal velocities are v_1 and v_2 in the experiment, then

A. $v_1 = v_2$

B. $v_1 > v_2$

C. $v_1 < v_2$

D. v_1 and v_2 are independent of R_1 and R_2

Answer: B

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136. A liquid flows through a horizontal tube of variable diameter. Then the pressure is lowest where

A. velocity is lowest

B. velocity is highest

C. diameter is largest

D. both velocity and diameter are largest

Answer: B

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137. In laminar flow of fluid, the velocity of the fluid in contact with the walls of the tube is

A. maximum

B. between 0 and maximum

C. equal to critical velocity

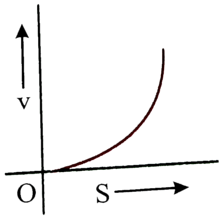
D. zero

Answer: D

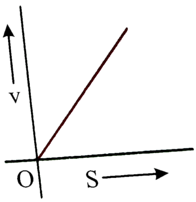
Watch Video Solution

138. A lead shot of a 1mm diameter falls through a long column of glycerine.The variation of its velocity v with distance covered is represented by,

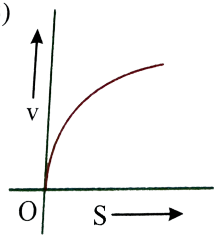
A. 1)

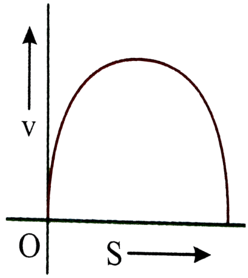


B. 2)



C. 3)



D. 

Answer: C

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139. A steel ball of mass m falls in a viscous liquid with terminal velocity v, then the steel ball of mass $8m$ will fall in the same liquid with terminal velocity

A. $2V$

B. $4V$

C. $6V$

D. $8V$

Answer: B

Watch Video Solution

140. A lead sphere is dropped into a medium. As the sphere falls, the velocity of lead sphere

A. remains constant throughout

B. decreases and finally becomes zero

C. decreases for some time and then becomes constant

D. increases for some time and then decreases

Answer: C

Watch Video Solution

141. Coefficent of viscosity (η) of a gas vary with temperature (T) as

A. $\eta \alpha \sqrt{T}$

B. $\eta \alpha T^2$

C. $\eta \alpha \frac{1}{T^2}$

D. $\eta \alpha \frac{1}{\sqrt{T}}$

Answer: A

Watch Video Solution

142. A spherical metal ball of mass m and radius (r) is falling through a viscous medium. The value of its terminal velocity is proportional to

A. $\frac{1}{r}$

B. $\frac{m}{r}$

C. $\sqrt{\frac{m}{r}}$

D. m

Answer: B

Watch Video Solution

143. The terminal velocity of a copper ball of radius $2mm$ falling through a tank of oil at $20^{\circ} C$ is $6.5 cm / s$. Find the viscosity of the oil at $20^{\circ} C$. Density of oil is $1.5 \times 10^3 Kg / m^3$, density of copper is $8.9 \times 10^3 Kg / m^3$.

A. $9.9 \times 10^{-1} kgm^{-1} s^{-1}$

B. $9.0 \times 10^{-1} kgm^{-1} s^{-1}$

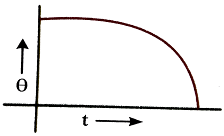
C. $8.0 \times 10^{-1} kgm^{-1} s^{-1}$

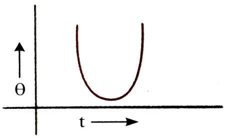
D. $8.5 \times 10^{-1} kgm^{-1} s^{-1}$

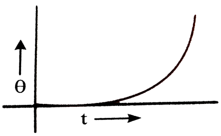
Answer: A

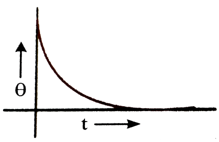
Watch Video Solution

144. If a cooling curve is drawn taking $t(s)$ along $X-\text{axis}$ and temperature (θ) along $Y-\text{axis}$, it appers as

A. 

B. 

C. 

D. 

Answer: D

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145. As difference of temperature of body and surroundings increases, rate of cooling

A. increases

B. decreases

C. does not depend on it

D. increases or decreases

Answer: A

Watch Video Solution

146. In the experiment to study relationship between temperture of the body and time if a graph is plotted between $\log(\theta - \theta_0)$ taking it along $y - \text{axis}$ and time (t) taking along $x - along$, it is

A. exponential

B. straight line

C. parabola

D. hyperbola

Answer: B

Watch Video Solution

147. In the above experiment, it is given that at time $t = 5 \text{ min}$, temperature of water $\theta('^\circ C) = 61$ and temperature of water in enclosure $\theta_0('^\circ C) = 30$. At $t = 8 \text{ min}$, if $\theta_0('^\circ C) = 30$, then $\theta^\circ(C)$ will be

A. $60^\circ C$

B. $< 61^\circ C$

C. $> 61^\circ C$

D. cant perdict

Answer: B

View Text Solution

148. While drawing cooling curve between the temperature of hot water and time we should stir the water uniformly, this has been done to ensure that

A. temperature of water in the calorimeter is same at all placed

B. cooling will occur fast to save the time of experiments

C. We can stir water non-uniformly also

D. None of these

Answer: A

Watch Video Solution

149. A glass full of hot milk is poured in the table. It begins to cool gradually. Which of the following is incorrect?

A. The rate of colling is constant till milk attains the temperature of the surrounding.

B. The temperature of milk falls off exponentially with time.

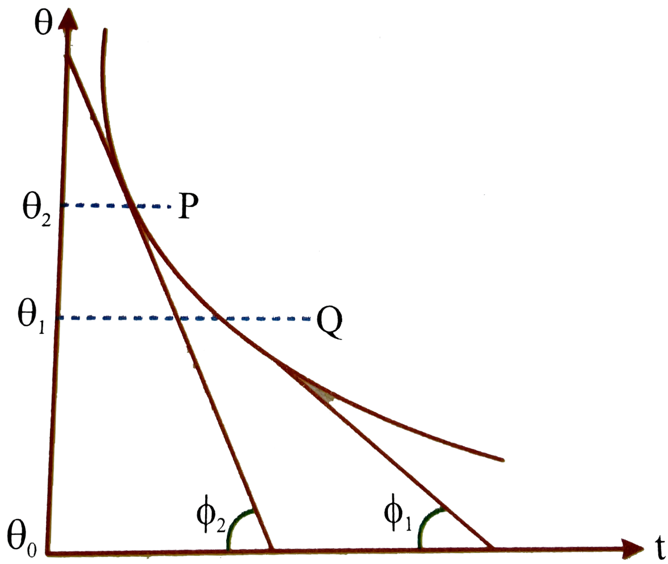
C. While cooling, there is a flow of heat from milk to the surrounding as well as form surrounding to the milk but the net flow of heat is form milk to the surrounding and that is why it cools.

D. All three phenomenon, conduction, convection and radiation are responsible for the loss of heat form milk to the surroundings.

Answer: A

Watch Video Solution

150. A body cools in a surrounding which is at constant temperature of θ_0. Assume that it obeys Newyon's law of colling. Its temperature θ is plotted against time t. Tangents are drawn to the curve at the points $P(\theta = \theta_t)$ and $Q(\theta = \theta_2)$. These tangents meet the time axis at angles of ϕ_2 and ϕ_1, as shown



A. $\dfrac{\tan\phi_2}{\tan\phi_1} = \dfrac{\theta_1 - \theta_0}{\theta_2 - \theta_0}$

B. $\dfrac{\tan\phi_2}{\tan\phi_1} = \dfrac{\theta_2 - \theta_0}{\theta_1 - \theta_0}$

C. $\dfrac{\tan\phi_1}{\tan\phi_2} = \dfrac{\theta_1}{\theta_2}$

D. $\dfrac{\tan\phi_1}{\tan\phi_2} = \dfrac{\theta_2}{\theta_1}$

Answer: B

Watch Video Solution

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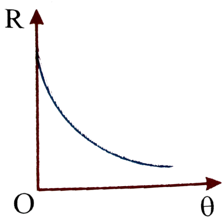
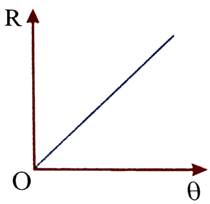
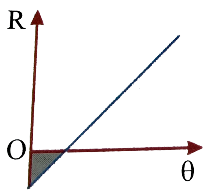
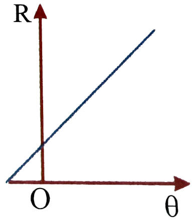
151. For a small temperature difference between the body and the surroundings, the relation between the rate of heat loss R and the temperature of the body is depicted by

A. 

B. 

C. 

D. 

Answer: C

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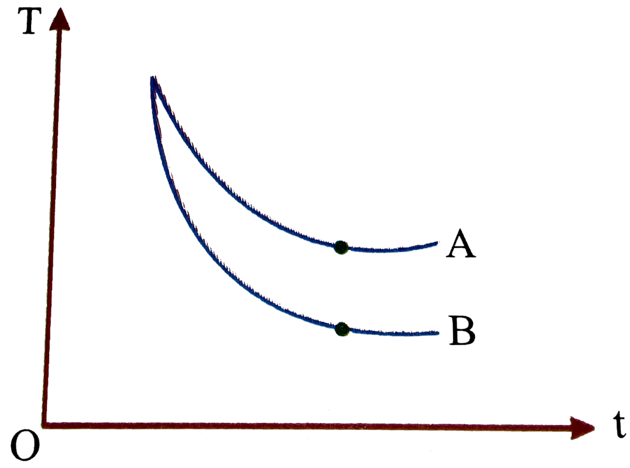
152. Water and turpentine oil (of specific heat less than that of water) are both heated to same temperature. Equal amounts of these placed in indentical claorimeters are then left in air.



A. Their colloing curves be identical

B. A and B will represent cooling curves of water and oil respectively.

C. B and A will represent cooling curves of water and oil, respectively.

D. None of these

Answer: B

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153. In a resonance tube, we get

A. stationary longitudinal wave

B. stationary transverse wave

C. progressive longitudinal wave

D. progressive transverse wave

Answer: A

Watch Video Solution

154. A tuning fork of frequency $500 Hz$ is sounded and resonanace is obtained at $17 cm$ and $52 cm$ of air column respectively in a resonating air column apparatus. The velocity of sound in air is

A. $650 ms^{-1}$

B. $350 ms^{-1}$

C. $700 ms^{-1}$

D. $190 ms^{-1}$

Answer: B

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155. In a resonance apparatus, the first and second resonating lengths of air column are $15cm$ and $48cm$ respectively. The end correction for this apparatus is

A. $6cm$

B. $3cm$

C. $1.5cm$

D. $2cm$

Answer: C

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156. When a stationary wave is formed then its frequency is

A. same as that of the individual waves

B. twice that of individual wave

C. half as that of an individual wave

D. four times as that of an individual wave

Answer: A

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157. The apparatus used to find the speed of sound in a gas is

A. Melde's apparatus

B. Quinke's tube apparatus

C. Kundt's apparatus

D. Newton's apparatus

Answer: C

Watch Video Solution

158. The change in speed of sound in a gas is independent of change is

A. temperature of the gas

B. pressure of the gas

C. density of the gas

D. both pressure and temperature

Answer: B

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159. The correct statement out of the following is

A. both sound and light waves in air are transverse

B. both sound and light waves in air are longitudinal

C. sound waves in air are transverse and light waves in air are longitudinal

D. sound waves in air are longitudinal and light waves in air are transverse.

Answer: D

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160. A tuning fork is used as a source of standard frequency because

A. it is U-shaped body

B. it is made of a metal

C. it has two symmetrical prongs

D. it retains its frequency despite small changes in temperature

Answer: D

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161. If air is replaced by hydrogen in an organ pipe then

A. the fundamental frequency decreases

B. the fundamental frequency increases

C. the fundamental frequency remains same

D. stationary waves are not formed

Answer: B

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162. With increases in temperature the frequency of sound in an organ pipe

A. decreases

B. increases

C. remains same

D. becomes zero

Answer: B

Watch Video Solution

163. When a closed organ pipe of length l if the velocity of sound is v then the fundamental frequency will be

A. $\frac{V}{4l}$ and only even harmonics are present

B. $\frac{V}{2l}$ and only odd harmonics are present

C. $\frac{V}{2l}$ and even as well as odd harmonics are present

D. $\frac{V}{4l}$ and only odd harmonics are present

Answer: D

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164. There are two organ pipes of exactly the same length and material but of different radii. The frequencies of their fundamental notes are such that

A. wider pipe has lower frequency

B. narrow pipe has lower frequency

C. both will have the same frequency

D. both will have infinite frequency

Answer: A

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165. In an open end organ pipe of length l if the speed of sound is V then the fundamental frequency will be

A. $\frac{V}{2l}$ and both odd as well as even harmonics are present

B. $\frac{V}{4l}$ & both odd as well as even harmonics are present

C. $\frac{V}{2l}$ and only even harmonics are present

D. $\frac{V}{4l}$ and only even harmonics are present

Answer: A

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166. An open pipe is in resonance in its fundamental mode. Air, hydrogen and ethane are filled in succession in this pipe. The speed of sound is different in these three media on account of which

A. only the wavelength changes

B. both frequency and wavelength change

C. only the frequency changes

D. neither frequency nor wavelength changes

Answer: C

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167. An air column in a pipe, when is closed at one end, is in resonance with a vibrating tuning fork of frequency $264H_Z$. If $v = 330m/s$, the length of the column in cm is (are)

A. 31.25

B. 62.5

C. 93.75

D. 125

Answer: A::C

Watch Video Solution

168. Two closed organ pipes give 10 beats between the fundamental when sounded together. If the length of the shorter pipe is $1m$ then the length of the longer pipe will be (speed of sound in air is $340ms^{-1}$)

A. $2.87m$

B. $0.87m$

C. $1.13m$

D. $2.13m$

Answer: C

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169. Stationary waves are setip in an air column. Velocity of sound in air is $330ms^{-1}$ and frequency is $165Hz$. The distance between two successive nodes is

A. $2m$

B. $1m$

C. $0.5m$

D. $4m$

Answer: B

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170. An open pipe of length l vibrates in fundamental mode. The pressure variation is maximum at

A. $\frac{l}{4}$ from the ends

B. the middle of the pipe

C. the end of the pipe

D. $\frac{l}{8}$ from its ends

Answer: B

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171. A glass tube $1.5m$ long and open at both ends, is immersed vertically in a water tank completely. A tuning fork of 660 Hz is vibrated and kept at the upper end of the tube and the tube is gradually raised out of water the total number of resonances heard before the tube comes out of water taking velocity of sound air $330m/s$ is

A. 12

B. 6

C. 8

D. 4

Answer: B

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172. A vertical tube is made to stand in water so that the water level can be adjusted. Sound wave of frequency $320Hz$ are sent into the top of the tube. If standing waves are produced at two successive water levels of $20cm$ and $73cm$, what is the speed of sound waves in the air in the tube (in m/s)

A. 339

B. 332

C. 334

D. 336

Answer: A

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173. When temperature increases, the frequency of a tuning fork

A. increases

B. decreases

C. remains same

D. Increases or decreases depending on the material.

Answer: B

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174. While measuring the speed of sound by performing a resonance column experiment, a student gets the first resonance condition at a column length of $18cm$ during winter. Repeating the same experiment during summer, she measures the column length to be xcm for the second resonance. Then

A. $54 > x > 36$

B. $36 > x > 18$

C. $18 > x$

D. $x > 54$

Answer: D

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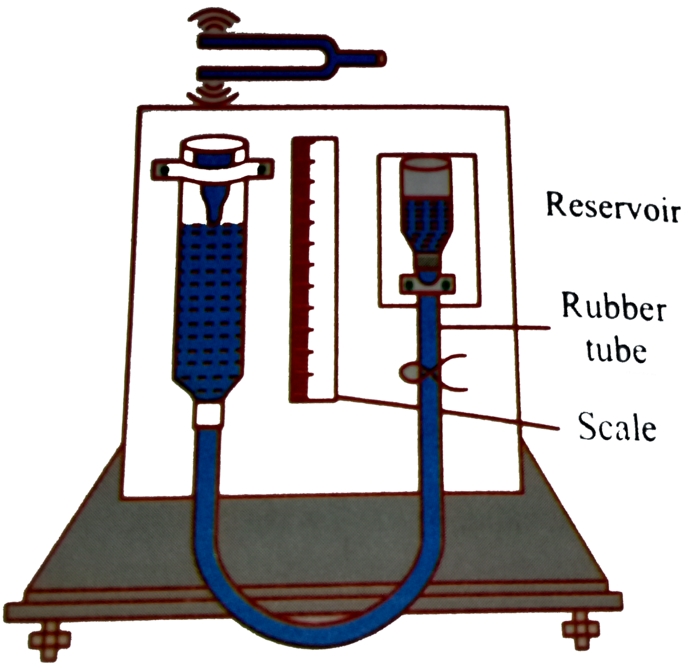
175. A tuning fork vibrating with frequency of $512Hz$ is kept close to the open end of a tube filled with water (figure). The water level in the tube is gradually lowered. When the water level is $17cm$ below the open end maximum internsity of sound is heard If the room temperature is $20^\circ C$ calculate



A. Speed of sound in air at room temperature

B. speed of sound in air at $0^\circ C$

C. If the water in the tube is replaced with mercury,

will there be any difference in your observation ?

D. All of the above

Answer: D

View Text Solution

176. The heat capacity of a body depends on

A. the quantity of heat energy supplied to it

B. rise in temperature of the body

C. the mass of the body

D. the material of the body

Answer: C::D

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177. If heat a supplied to a solid, its temperature

A. must increase

B. may increase

C. may remain constant

D. must decrease

Answer: B::C

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178. Calorimeter usually is made of copper because

A. it is cheaper and easily available

B. it does not get rusted

C. its emissive power is more

D. its thermal conductivity is high

Answer: D

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179. The direction of flow of heat between two bodies is determined by

A. kinetic energy

B. internal energy

C. total energy

D. the temperature difference between the bodies

Answer: D

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180. What is specific heat of gas in isothermal changes?

A. infinite

B. zero

C. negative

D. either zero or one

Answer: A

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181. If temperature scale is changed from $'^\circ C$ to $'^\circ F$, the numerical value of specific heat

A. decreases

B. increases

C. remains constant

D. becomes infinity

Answer: A

Watch Video Solution

182. Which of the following has maximum specific heat?

A. water

B. alcohol

C. glycerine

D. oil

Answer: A

Watch Video Solution

183. $100g$ ice at $0^{\circ}C$ is mixed with $100g$ water at $100^{\circ}C$. The resultant temperature of the mixture is

A. $10^{\circ}C$

B. $20^\circ C$

C. $30^\circ C$

D. $40^\circ C$

Answer: A

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184. A liquid of mass M and specific heat S is at a temperature $2T$. Another liquid of thermal capacity $1.5 \times$ the first liquid at a temperature $\frac{T}{3}$ is added to it. The resultant temperature of the mixture will be

A. $\frac{2T}{3}$

B. $\frac{T}{2}$

C. T

D. $\frac{4T}{3}$

Answer: C

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185. A liquid A of specific heat 0.5 at $60^{\circ}C$ is mixed with another liquid B of specific heat 0.3 at $20^{\circ}C$. After mixing, the resultant temperature of the mixture is $30^{\circ}C$. The ratio of masses of A and B respectively is

A. $1:2$

B. $1:3$

C. $1:5$

D. $2:3$

Answer: C

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186. An aluminium vessel of mass $0.5kg$ contains $0.2kg$ of water at $20^{\circ}C$. A block of iron of mass $0.2kg$ at $100^{\circ}C$ is gently put into the water .Find the equilibrium temperature of the mixture.

Specific heat capacities of aluminium , iron and water are

$910 Jkg^{-1}K^{-1}$, $470 Jkg^{-1}K^{-1}$ and $420 Jkg^{-1}K^{-1}$ respectively.

A. 342

B. 432

C. 232

D. 132

Answer: B

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187. An electric heater of power $150W$ is immersed in $0.75kg$ of ice at $0^{\circ}C$ in a lagged container of negligible heat capacity. The temperature remains constant for 27.5 minutes and then rises to $40.0^\circ C$ in further $14 \min utes$. Calculate the specific heat capacity of water.

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

A. high resitivity and low temperature coefficient

B. high resitivity and high temperature coefficient

C. low resistivity and high temperature coefficient

D. low resistvitiy and low temperature coefficient

Answer: D

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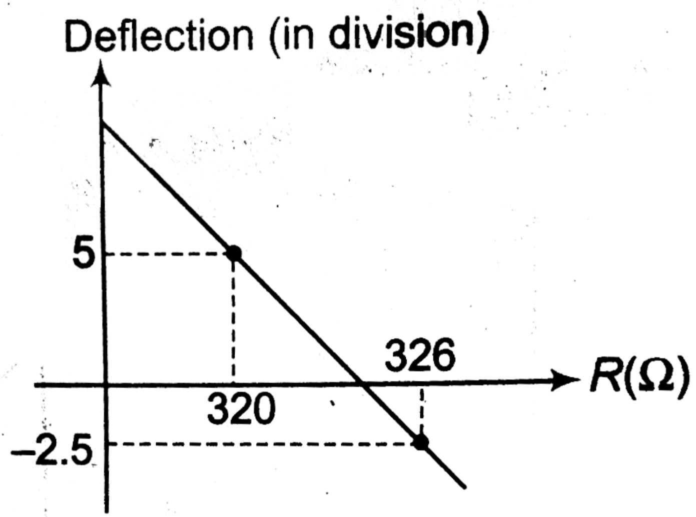
189. For a post office box, the graph of galvanometer deflection versus (R) (resistance pulled out of resistance box) for the ratio $100:1$ is given as shown. Find the value of unknown resistance.



A. 3.2Ω

B. 3.24Ω

C. 3.206Ω

D. 3.2375Ω

Answer: B

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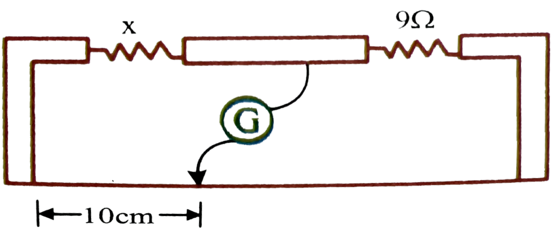
190. Consider the meter bridge shown in the figure below



The resistance X has temperature coefficent α_1 and known resistance box [9Ω shown] has α_2. For shown situation balance point is at $10cm$ from left end, if temperature of system increases by ΔT due to joule heating, then the shift in the balance point is (Assume that only the resistance of X and resistance box changes

due to change in temperature and there is no other effect).

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. $\frac{1}{9}(\alpha_1\alpha_2)\Delta T$

Answer: A

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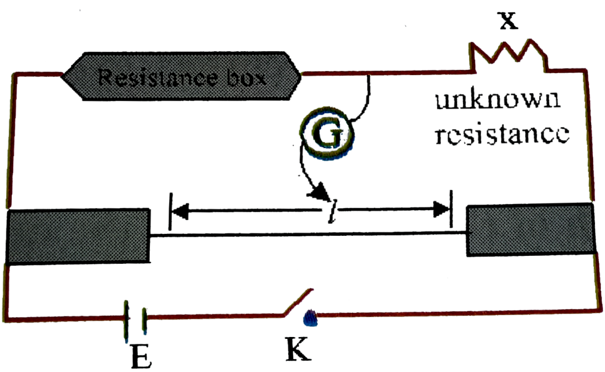
191. In meter bridge experiment the observation table and circuit diagram are shown in figure

SNO	$R(\Omega)$	$l(cm)$
1	1000	$60cm$
2	100	$13cm$
3	10	$1.5cm$
4	1	$1.0cm$



Which of the following readings is not taken correctly?

A. 1

B. 2

C. 3

D. 4

Answer: D

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192. In above question the value of unknown resistance is

A. 664Ω

B. 100Ω

C. 348Ω

D. 864Ω

Answer: A

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193. In meter brigde of Wheatstone bridge for measurment of resistance, the known and the unknown resistance are interchanged. The error so removed is

A. end error

B. index error

C. error due to thermo-electric effect

D. random error

Answer: A

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194. Two resistances are connected in two gaps of slide wire bridge. The balance point is at $40cm$ from left end. A resistance X is connected in series with smaller resistance R and balance point shifts to $40cm$ from right end. What is the value of X if R is 4Ω?

A. 4Ω

B. 5Ω

C. 6Ω

D. 7Ω

Answer: B

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195. A, B, C and D are four resistance of $2\Omega, 2\Omega, 2\Omega$ and 3Ω respectivey. They are used to form a wheatstone bridge. The resistance D is short circuited with a resistance R in order to get the bridge balanced. The value of R will be

A. 4Ω

B. 6Ω

C. 8Ω

D. 3Ω

Answer: B

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196. Statement-1 : In a Meter Bridge experiment, null point for an unknown resistance is measured. Now, the unknown resistance is put inside an enclosure maintained at a higher temperature. The null point can be obtained at the same point as before by decreasing the value of the standard resistance.

Statement-2 : Resistance of metal increases with increase in temperature.

A. Statement-I is true, Statement-II is false

B. Statement-I is true, Statement-II is true, Statement-II is a correct explanation for Statement-I

C. Statement-I is false, Statement-II is true, Statement-II is not a correct explanation for Statement-I

D. Statement-I is false, Statement-II is true

Answer: D

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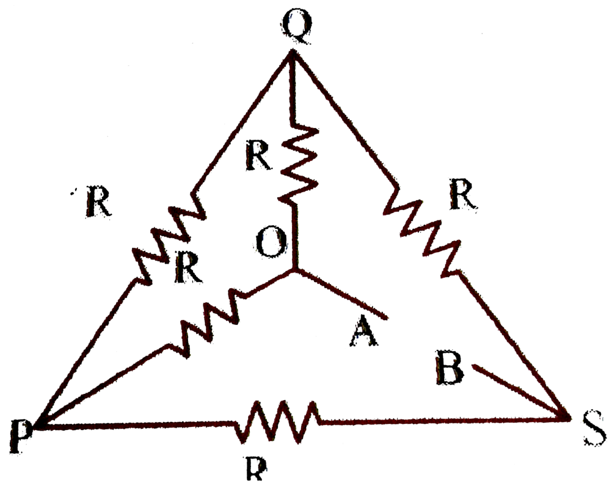
197. If each of the resistance in the network in figure R, the equivalent resistance between terminals A and B is



A. $5R$

B. $2R$

C. $4R$

D. R

Answer: D

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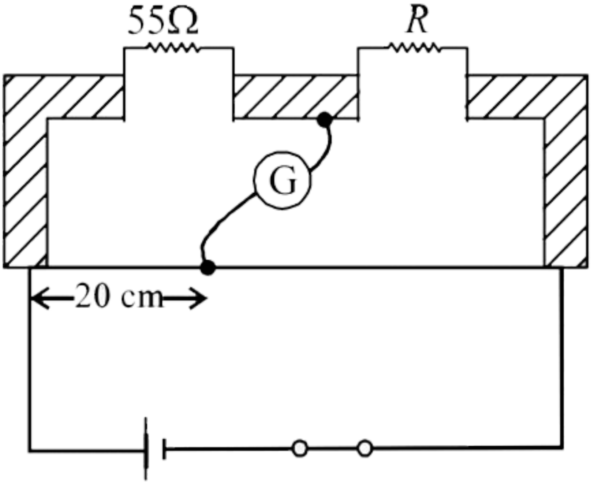
198. Shown in the figure below is a meter- bridge set up will null deflection in the galvanometer.



The value of the unknown resistor R is

A. 110Ω

B. 55Ω

C. 13.75Ω

D. 220Ω

Answer: D

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199. Out of the following the one which is not the active material in a lead storage cell is

A. lead peroxide

B. lead sulphate

C. sponge lead

D. sulphuric acid

Answer: B

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200. The capacitance of a capacitor does not depend upon

A. rate of dicharge

B. temperature

C. amount of active material

D. rate of charging

Answer: B

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201. The correct method of connecting circuit in Ohm's law experiment is

A. voltmeter is series and ammeter in parallel

B. both voltmeter and ammeter are in series

C. both voltmeter and ammeter are in parallel

D. voltmeter in parallel and ammeter in series

Answer: D

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202. Two identical batteries are connected such that their positive terminals are together and negative terminals are together. Then

A. the emf of the combination is zero

B. potential difference across each cell is zero

C. current in the circuit is zero

D. resistance in the circuit is zero

Answer: A::C

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203. The material of wire chosen for rheostat is

A. copper

B. aluminium

C. constantan

D. lead

Answer: C

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204. A rheostat is used in an electric circuit

A. to change the resistance of the circuit

B. to change the potential difference

C. to change emf

D. to change the current through a particular instruement

Answer: D

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205. Resistance of conductor depends on

A. applied potential difference across the conductor and electric current passing through the conductor

B. length and area of cross- section of the conductor

C. temperature of the conductor

D. both 2 and 3

Answer: D

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206. $1kg$ piece of copper is drawn into a wire $1mm$ thick and another piece into a wire $2mm$ thick. Compare the resistance of these wires.

A. $2:1$

B. $4:1$

C. $8:1$

D. $16:1$

Answer: D

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207. The resistance of dry human body is measured by

A. Ohm's law apparatus

B. slide wire bridge

C. AVO meter

D. meter bridge

Answer: C

Watch Video Solution

208. Inside a resistance box various resistance coils are connected

A. in series

B. in parallel

C. some in series and and some in parallel

D. all in parallel except one.

Answer: A

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209. By increasing the temperature , the specific resistance of a conductor and a semiconductor

A. increases

B. decreases

C. remain same

D. becomes zero

Answer: A

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210. If the positions of voltmeter and ammeter are interchanged in Ohm's law circuit, then

A. both the instruments will be damaged for flow of large current

B. No effect on the readings of both the instruments

C. both will show the reading out of scale

D. no instrument will be harmed due to the flow of very small current

Answer: D

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211. By increasing the temperature , the specific resistance of a conductor and a semiconductor

A. increases

B. decreases

C. remains same

D. becomes zero

Answer: B

Watch Video Solution

212. If the resistivity of an alloy is ρ' and that of consituent metals is $'\rho'$ then

A. $\rho' > \rho$

B. $\rho' < \rho$

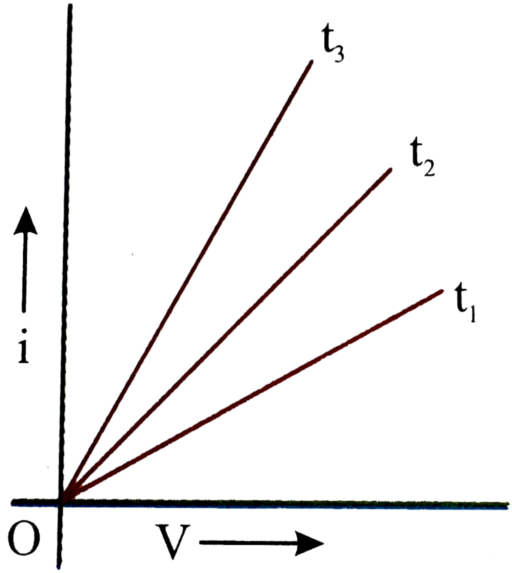
C. $\rho' = \rho$

D. There is no relation between ρ and ρ'

Answer: A

Watch Video Solution

213. $V - i$ graphs of anichrome wire at three different temeperatures t_1, t_2 and t_3 are shown. From the graph.



A. $t_1 < t_2 < t_3$

B. $t_1 > t_2 > t_3$

C. $t_1 < t_2 > t_3$

D. $t_1 > t_2 < t_3$

Answer: B

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214. The resistance of an incadescent lamp is

A. greater when swictched off

B. greater when switched on

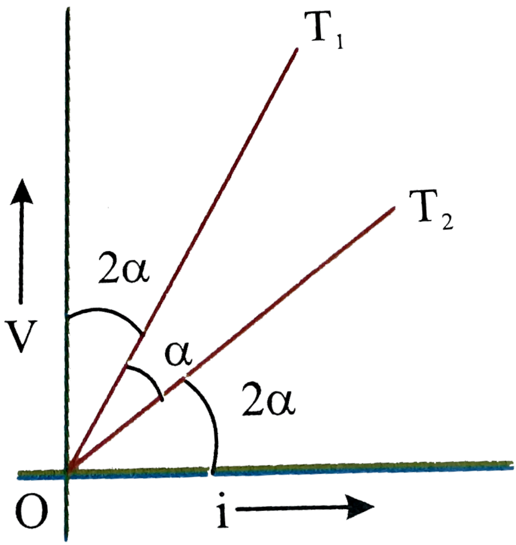
C. zero when switched on

D. infinity when switched of

Answer: B

Watch Video Solution

215. The figure shows the variation of V with i at temperatures T_1 and T_2. Then $T_1 - T_2$ is proportional to



A. $\tan 2\alpha$

B. $\tan \alpha$

C. $\sin \alpha$

D. $\cos 2\alpha$

Answer: B

216. The resistance of a wire of length l and diameter d is R. The wire is stretched to double its length. The resistance of the wire will now be

A. $\frac{R}{2}$

B. $2R$

C. $4R$

D. $16R$

Answer: C

217. What is immeterial for an electric fuse wire ?

A. its specific resistance

B. its radius

C. its length

D. current flowing through it

Answer: C

Watch Video Solution

218. The conductivity of a super conductor is

A. infinity

B. large

C. very small

D. zero

Answer: A

Watch Video Solution

219. Assertion (A): In Ohm's law experiment, the reading of voltmenter and ammeter are $13.5V$ and $0.40A$ respectively, then the measured computed value of R is 33.75Ω upto correct SD's

Reason(R): The reliability in computed value can not be more than the reliability in measured values.

A. If both assertion and reason are true and the reason is the correct explantion of the assertion.

B. If both assertion and reason are true and the reason is not the correct explantion of the assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true.

Answer: D

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220. Assertion(A): In Ohm's law experiment potential drop across a resistance wire was measured as $5.0V$ and current was measured as $2.00A$. The maximum permissible error in resistance is $\pm 25\ \%$

Reason(R): In experiment of assertion the least count of ammeter is $0.01A$.

A. Both assertion and reason are true and the reason is the correct explanation of the assertion.

B. Both assertion and reason are true but the reason is not the correct explanation of the assertion.

C. Assertion is true but reason is false.

D. Assertion is false but reason is true.

Answer: B

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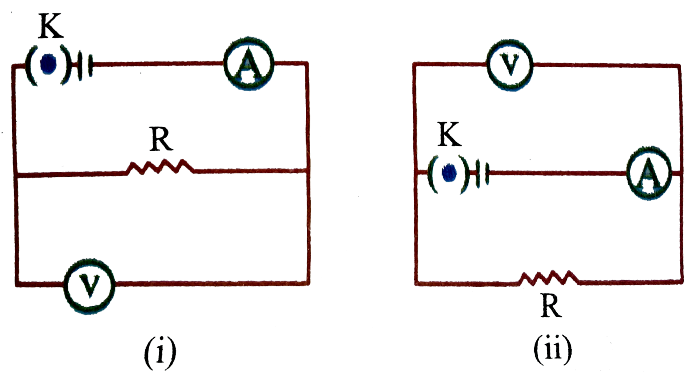
221. In measuring the values of resistance, different students connect ammeter and voltmeter as shown in following figures. Which of these will be correct?



A. Both figures are correct

B. Both are wrong

C. Only figure (i) is correct

D. Only figure (ii) is correct

Answer: A

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222. Potentiometer is superior to voltmeter because

A. potentiometer has high resistance

B. potentiometer has low resistance

C. potentiometer does not draw any current from the unknown source of emf to be measured

D. potentiometer has greater size than voltmeter

Answer: C

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223. Potentiometer wire is made of manganin because it has

A. high conductivity

B. negligible melting point

C. high temperature coefficent of resistance

D. negligibly small temperature coeficient of resistance

Answer: D

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224. In a potentiometer experiment the balancing with a cell is at length 240 cm. On shunting the cell with a resistance of 2Ω, the balancing length becomes 120 cm.The internal resistance of the cell is

A. 2Ω

B. 4Ω

C. 0.5Ω

D. 1Ω

Answer: A

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225. In a potentiometer whose wire resistance is 10Ω. The potential fall per cm is V volts is reduced to $\frac{V}{4}$ volt / cm. The resistance that must be connected in series with the potentiometer wire is

A. 40Ω

B. 30Ω

C. 20Ω

D. 10Ω

Answer: A

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226. Sensitvity of a potentiometer

A. increases with the increases of length of the wire

B. decreases with the increase of length of the wire

C. increases with the decrease of length of the wire

D. does not depend on the length of the wire

Answer: A

Watch Video Solution

227. Potentiometer is an ideal instrument because

A. no current is drawn from the source of unknown emf

B. current is drawn from the source of unknown emf

C. it gives deflection even at null point

D. it has variable potential gradient

Answer: A

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228. For a potentiometer to function, the emf of the cell (E) in the primary circuit compared to the emf of the cell (E^1) in the secondary circuit should have a realtion

A. $E > E^1$

B. $E = E^1$

C. $E < E^1$

D. $E \leq E^1$

Answer: A

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229. In a potentiometer, balance point is obtained, when

A. the emf of the battery in the primary circuit is equal to the emf of the experimental cell in the secondary circuit.

B. the potential differences of the wire between the $+ve$ end and jockey becomes equal to the emf of the experimental cell.

C. the potential difference of the wire between the $+ve$ end and jockey becomes equal to the emf of the battery connected in the primary circuit.

D. the potential difference across the potentiometer wire becomes equal to the emf of the battery.

Answer: B

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230. Sensitivity of potentiometer can be increased by

A. decreasing the length of the wire

B. increasing the emf of the battery in the primary circuit

C. decreasing the potential gradient on its wire

D. increasing the potential gradient on its wire

Answer: C

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231. If the current in the primary circuit is decreased, then the balancing length is obtained at

A. lower length

B. higher length

C. same length

D. at zero length

Answer: B

Watch Video Solution

232. In potentiometer experiment, the unknown potential difference is compared with

A. unknown resistance

B. known resistance

C. known standard resistance

D. internal resistance of the cell

Answer: C

Watch Video Solution

233. On increasing the resistance of primary circuit of potentiometer, its potential gradient

A. becomes more

B. becomes less

C. does not change

D. becomes infinite

Answer: B

Watch Video Solution

234. The specific resistance and area of cross section of the potentiometer wire are ρ' and A respectively. If a current i passes through the wire, its potential gradient will be

A. $\frac{i\rho}{A}$

B. $\frac{i}{\rho A}$

C. $\frac{iA}{\rho}$

D. $iA\rho$

Answer: A

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235. At the moment when the potentiometer is balanced,

A. cannot flows only in the primary circuit

B. current flows both in primary and secondary circuits

C. current flows only in the secondary circuit

D. current does not flow in any circuit (primary or secondary)

Answer: A

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236. In a potentiometer of ten wires each of $1m$, the balance point is obtained on the sixth wire. To shift the balance point to eighth wire, we should

A. increases the resistance in the primary circuit

B. decrease the resistance in the secondary circuit

C. decrease the resistance in series with the cell whose emf is to be determined

D. increases the resistance in series with the cell whose emf's is to be determined.

Answer: A

Watch Video Solution

237. The potential gradients on the potentiometer wire are V_1 and V_2 with an ideal cell and a real cell of same emf in the primary circuit, then

A. $V_1 = V_2$

B. $V_1 > V_2$

C. $V_1 < V_2$

D. $V_1 \leq V_2$

Answer: B

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238. The balancing lengths on a potentiometer wire are $800cm$ and $600cm$ when two cells of emfs E_1 and E_2 are connected in the secondary circuit first to help each other and next to oppose each other, then $\frac{E_1}{E_2} =$

A. $1/11$

B. $14/11$

C. $7/1$

D. $4/3$

Answer: C

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239. Then 6 identical cells of no internal resistance are connected in series in the second arycircuit of a potentiometer, the balancing length is l if two of them are wrongly connected to balacing length becomes

A. $\frac{l}{4}$

B. $\frac{l}{3}$

C. l

D. $\frac{2l}{3}$

Answer: B

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240. The balancing length on a potentiometer wire with a cell of emf $2V$ and internal resistance 1Ω connected in the secondary circuit with no load is $200cm$. If a resistor of 19Ω is connected parallel to the cell, the balancing length

A. decreases by 10%

B. decreases by 20%

C. decreases by 5%

D. decreases by 10%

Answer: C

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241. A potentiometer wire of length $10m$ and resistance 20Ω is connected in series with another resistance of 80Ω and a battery of emf $4V$. The potential gradient on the wire will be (in mV/cm)

A. 0.8

B. 0.16

C. 0.2

D. 0.4

Answer: A

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242. The figure of merit of a galvanometer is

A. the voltage required to produce a deflection of one division

B. the current required to produce a diflection of 10 divisions

C. the voltage required to produce a deflection of 10 divisions

D. the current required to produce a deflection of one division

Answer: A

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243. Galvanometer shows deflection when current passes through it. This is because,

A. it is based on heating effect of current

B. it is based on magnetic effect of current

C. it is based on induced emf

D. it is based on electrolysis

Answer: B

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244. The sensitivity of a galvanometer depends on

A. the cylindrical magnetic field used in the galvanometer

B. area of the coil

C. torsion constant of the spring

D. All of the above

Answer: D

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245. In an ammeter 5% of the total current is passing through the galvanometer of resistance G. The resistance of shunt (S) required will be

A. $19G$

B. $G/19$

C. $20G$

D. $G/20$

Answer: B

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246. The sensitivity of a galvanometer does not depend upon

A. the very strong magnetic field in the permanent magnet

B. the current it measures

C. a very thin and weak suspension

D. large number of turns in the coil.

Answer: B

Watch Video Solution

247. The value of shunt to be used to pass $1/10th$ of the total current through a galvanometer of resistance 100Ω is

A. 41.11Ω

B. 31.11Ω

C. 21.11Ω

D. 11.11Ω

Answer: D

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248. A galvanometer has a sensitivity of 10 divisions per milli ampere. Its resistance is 50Ω. The shunt required to change its sensitivity to 2 divisions per milli ampere is

A. 42.5Ω

B. 32.5Ω

C. 22.5Ω

D. 12.5Ω

Answer: D

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249. The ratio of the shunt resistance and the resistance of a galvanometer is $1:499$. If the full scale deflection current of the galvanometer is $2mA$, the range of the ammeter is

A. $4A$

B. $3A$

C. $2A$

D. $1A$

Answer: D

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250. An ammeter reads upto 1 ampere. Its internal resistance is 0.81 ohm. To increase the range to 10 A the value of the required shunt is

A. 0.03Ω

B. 0.3Ω

C. 0.9Ω

D. 0.09Ω

Answer: D

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251. The relation between voltage sensitivity $'\sigma_V'$ and current sensitiviy σ_i of moving coil galvanometer if its resistance is $'G'$ is

A. $\sigma_V = G\sigma_i$

B. $\sigma_V = \frac{\sigma_i}{G}$

C. $\sigma_V\sigma_i = G$

D. $\sigma_V^2\sigma_i^2 = G$

Answer: B

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252. The sensitivity of a galvanometer of resistance 990Ω is increased by 10 times. The shunt used is

A. 100Ω

B. 120Ω

C. 110Ω

D. 50Ω

Answer: C

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253. When a high resistance $'R'$ is connected in series with a volmeter of resistance $'G'$, the range of the volmeter increases 5times. Then $G : R$ will be

A. $4 : 1$

B. $1 : 2$

C. $8 : 1$

D. $1 : 4$

Answer: D

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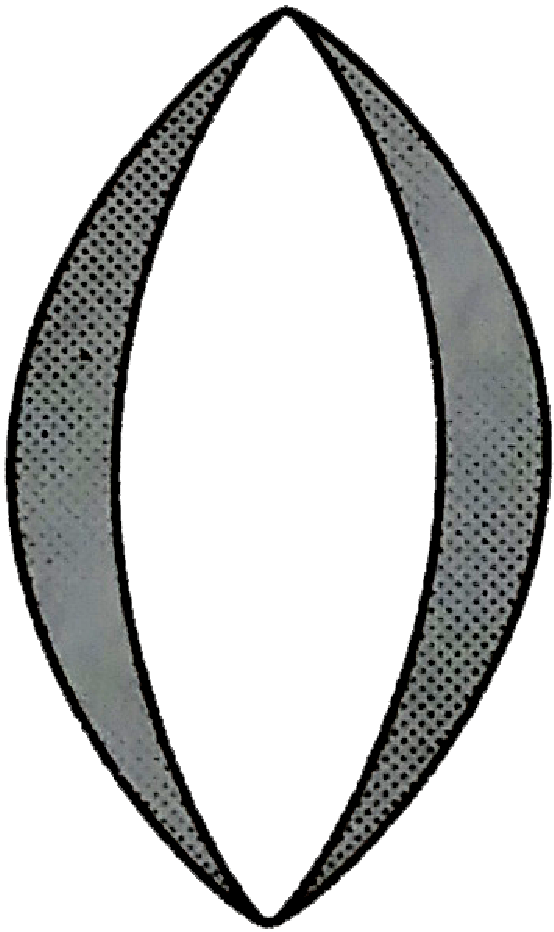

254.

A convex lens is made of 3 layers of glass of 3 different materials as in the figure. A point object is placed on its axis. The number of images of the object are

A. 1

B. 2

C. 3

D. 4

Answer: C

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255. A concave mirrorr has a focal length $20cm$. The distance between the two positions of the object for which the image size is double of the object size is

A. $20cm$

B. $40cm$

C. $30cm$

D. $60cm$

Answer: A

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256. A concave mirror of focal length f produces a real image n times the size of the object. The distance of the object from the mirror is

A. $(n-1)f$

B. $\frac{(n-1)f}{n}$

C. $(n+1)f$

D. $\dfrac{n}{(n-1)f}$

Answer: B

Watch Video Solution

257. A convex lens of focal length f produces a virtual image n times the size of the object. Then the distance of the object from the lens is

A. nf

B. $\dfrac{f}{n}$

C. $\dfrac{(n+1)f}{n}$

D. $(n-1)f$

Answer: C

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258. When a convex lens of refactive index $3/2$ and focal length $20cm$ is dropped into water of refracticve index $4/3$. Its focal length in water is

A. 20

B. $40cm$

C. $80cm$

D. $10cm$

Answer: C

259. The minimum distance between an object and its real image formed by a convex lens is

A. f

B. $2f$

C. $3f$

D. $4f$

Answer: D

260. A converging lens is used to form an image on a screen. When the upper half of the lens is covered by an opaque screen

A. half the image is not seen

B. full image is seen with same intensity

C. full image is seen with decreased intensity

D. no image is observed

Answer: C

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261. An object is placed at a distance of $f/2$ from a convex lens. The image will be

A. at $\frac{3f}{2}$, real and inverted

B. at, $2f$, virtual and erect

C. at, $2f$, real and inverted

D. at one of the focii, virtual, erect and double the size.

Answer: D

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262. The focal length of a convex lens is $30cm$ and the size of the real image is $\frac{1}{4}th$ of the object. Then the object distance is

A. $150cm$

B. $90cm$

C. $60cm$

D. $30cm$

Answer: A

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263. A convex lens is dipped in a liquid whose refractive index is equal to the refractive of the lens. Then its focal length will

A. becomes zero

B. becomes infinite

C. remains unchanged

D. becomes reduced but not zero

Answer: B

Watch Video Solution

264. Let f_v and f_r are the focal lengths of a convex lens for violet and red lights respectively. If F_v and F_r are the focal lengths of a concave lens for violet and red light respectively, then

A. $f_V < f_R$

B. $f_V > f_R$

C. $f_V = f_R$

D. $f_V \geq f_R$

Answer: A

Watch Video Solution

265. An object $5cm$ tall is placed $10cm$ form a convex mirrorr of radius of curvature $30cm$. What is the nature and size of the image ?

A. virtual, erect, behind the mirror, $10cm$ in size

B. virtual, erect, behind the mirror, $3cm$ in size

C. real, inverted, infront of the mirror, $10cm$ in size

D. real, inverted, infront of the mirror, $3cm$ in size

Answer: B

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266. Two objects A and B when placed in turn in front of a concave mirror of radius of curvature $15cm$, give images of equal size. If A is three times the size of B and is placed $30cm$ from the mirror, the distance of B from the mirror is

A. $20cm$

B. $15cm$

C. $12.5cm$

D. $9.5cm$

Answer: B

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267. A convex mirror forms a real image 5 times the size of the object placed at a distance of 20cm from it. The radius of curvature of the mirror is

A. $\frac{100}{3}cm$

B. $\frac{50}{3}cm$

C. $100cm$

D. $50cm$

Answer: A

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268. A mirror produces on a screen an image of the sun $2cm$ in diameter. If the sun's disc subtends an angle 0.1 radian on the surface of the earth, then the radius of curvature of the mirror is

A. $20cm$

B. $40cm$

C. $200cm$

D. $400cm$

Answer: B

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269. A small strip of plane mirror A is set with its plane normal to the prinicipal axis of a convex mirror B and placed $10cm$ in front of B which it partly covers. An object is placed $20cm$ from A and the two virtual images formed by reflection in A and B coincide without parallax. The radius of curvature of B is

A. $20cm$

B. $22.5cm$

C. $27.5cm$

D. $30cm$

Answer: D

View Text Solution

270. An object is placed in front of a mirror at a distance of $60cm$. If its two times diminished image is formed on the screen, the focal length of the mirror is

A. $20cm$

B. $45cm$

C. $15cm$

D. $90cm$

Answer: A

Watch Video Solution

271. An object is placed on the principal axis of a convex mirror. Distance of onject from the mirror is $40cm$. A plane mirror is placed between the object and the convex mirror, covering lower half below principal axis of the mirror. Distance between the object and the plane mirror is $30cm$. If there is no parallax between the two images formed by plane mirror and convex mirror, the focal length of the convex mirror is

A. $20cm$

B. $40cm$

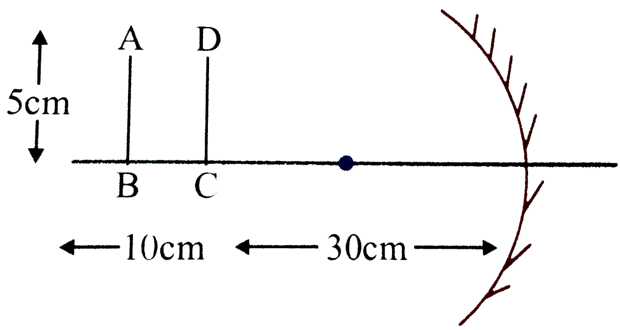
C. $60cm$

D. $80cm$

Answer: B

View Text Solution

272. U shaped wire is placed in front of a concave mirror of radius of curvature $20cm$ as shown. The total length of the image of the wire $ABCD$ is nearly



A. $2.5cm$

B. $6cm$

C. $12.5cm$

D. $15cm$

Answer: B

Watch Video Solution

273. One surface of a lens is convex and the other is concave, if the radii of curvature are r_1 and r_2 respectively, the lens will be convex if

A. $r_1 > r_2$

B. $r_1 = r_2$

C. $r_1 < r_2$

D. $r_1 = \frac{1}{r_2}$

Answer: C

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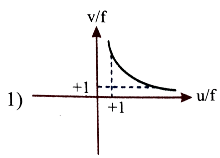
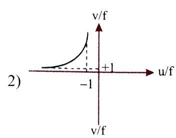
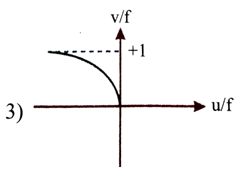
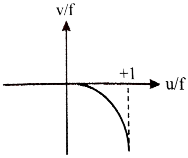
274. A real inverted image in a concave mirror is represented by (u,v, f are corrdinates)

A. 

B. 

C. 

D. 4) 

Answer: A

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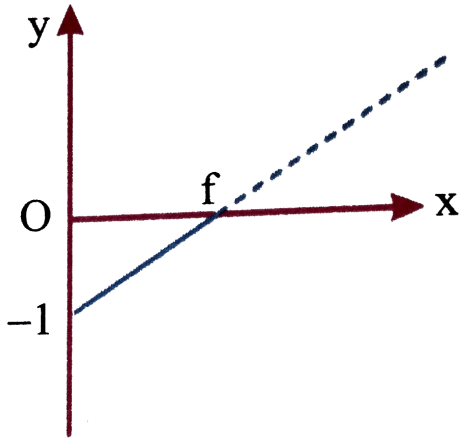
275. A thin convex lens is used to form a real image of a bright point object. The aperture of the lens is small. A graph shown is obtained by plotting, a suitable parameter y against another suitable parameter x. If

$f =$ focal length of lens.

$u =$ the object distance

$v =$ image distance



A. $(uv) \rightarrow x, (u+v) \rightarrow y$

B. $u+v \rightarrow x, uv \rightarrow y$

C. $u \rightarrow x, \frac{u}{v} \rightarrow y$

D. $\frac{1}{u} \rightarrow x, \frac{1}{v} \rightarrow y$

Answer: C

Watch Video Solution

276. In $u - v$ method for finding the focal length of a concave mirror. The mirror is fixed at position A marked $20.0 cm$ on an optical bench and an object needle is placed at position B marked $45.0 cm$ on an optical banch. For no parallax between object needle and image needle the image needle at position $C 57.5 cm$ on optical bench. Then percentage error in the measurement of focal length of the mirror is

A. 1.97%

B. 3.24%

C. 1.24%

D. 0

Answer: A

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277. To find the focal length of a convex mirror , a student records the following data:

Object Pin	Convex Lens	Convex mirror	Image Pin
$22.2cm$	$32.2cm$	$45.8cm$	$71.2cm$

The focal length of the convex lens is f_1 and that of mirror is f_2 . Then taking index correction to be negligibly small , f_1 and f_2 are close to :

A. $f_1 = 7.8cm \quad f_2 = 12.7cm$

B. $f_1 = 12.7cm \quad f_2 = 7.8cm$

C. $f_1 = 15.6cm \quad f_2 = 25.4cm$

D. $f_1 = 7.8cm \quad f_2 = 25.4cm$

Answer: A

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278. When light falls on a prism, the resultant can be

A. inversion

B. magnification

C. elongation

D. deviation

Answer: D

Watch Video Solution

279. The angular dispersion produced by a prism

A. increases if the average refractive index increases

B. increases if the avergae refractive index decreases

C. remains constant without depending on refractive index

D. no relation with average refractive index

Answer: A

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280. A glass prism is immersed completely in water. How does angle of minimum deviation change ?

A. increases

B. decreases

C. remains same

D. cannot be predicted

Answer: B

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281. If the angle of incidence and angle of refraction at the refracting surface are 45° and 30° respectively, then the refractive index of the material of the prism is

A. 2

B. $\sqrt{2}$

C. $\frac{1}{2}$

D. $\frac{1}{\sqrt{2}}$

Answer: B

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282. The angle of minimum deviation of a prism of refractive index $\sqrt{3}$ is equal to its refracting angle. Then the refracting angle of the prism is

A. 45°

B. 60°

C. 75°

D. 90°

Answer: B

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283. A prism of refractive index sqrt2 has refractive angle 60°. In the order that a ray suffers minimum deviation it should be incident at an angle of

A. 30°

B. 45°

C. 60°

D. 90°

Answer: B

Watch Video Solution

284. A certain prism of refracting angle 60° and of refractive index 2 is immersed in a liquid of refractive index $\sqrt{2}$. Then the angle of minimum deviation will be

A. 30°

B. 45°

C. 60°

D. 75°

Answer: A

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285. A prism of refractive index m and angle A is placed in the minimum deviation position. If the angle of minimum deviation is A, then the value of A in terms of m is

A. $\sin^{-1}\left[\frac{\mu}{2}\right]$

B. $\sin^{-1}\left[\frac{\sqrt{\mu^2-1}}{2}\right]$

C. $2\cos^{-1}\left[\frac{\mu}{2}\right]$

D. $\cos^{-1}\left[\frac{\mu}{2}\right]$

Answer: C

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286. The refracting angle of a prism is A and refractive index of the material of prism is $\cot(A/2)$. The angle of minimum deviation will be

A. $\pi + 2A$

B. $\pi - 2A$

C. $\frac{\pi}{2} + A$

D. $\frac{\pi}{2} - A$

Answer: B

Watch Video Solution

287. If angle of incidence, emergence and deviation are $45^\circ, 55^\circ$ and 40° then the angle of the prism is

A. 55°

B. 40°

C. 45°

D. 60°

Answer: D

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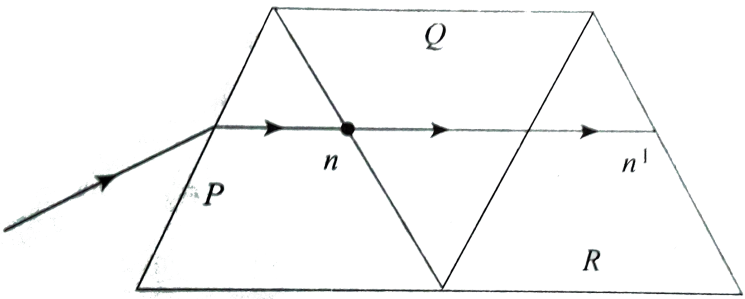
288. A given ray of light suffers minimum deviation in an equilateral prism P. Additional prism Q and R of identical shape and of the same material as P are now added as shown in figure. The ray will now suffer



A. greater deviation

B. no deviation

C. same deviation as before

D. total internal reflection

Answer: C

Watch Video Solution

289. The maximum value of refractive index of a prism which permits the transmission of light through it when the refracting angl e of the prism is 90°, is given by

A. $\sqrt{3}$

B. $\sqrt{2}$

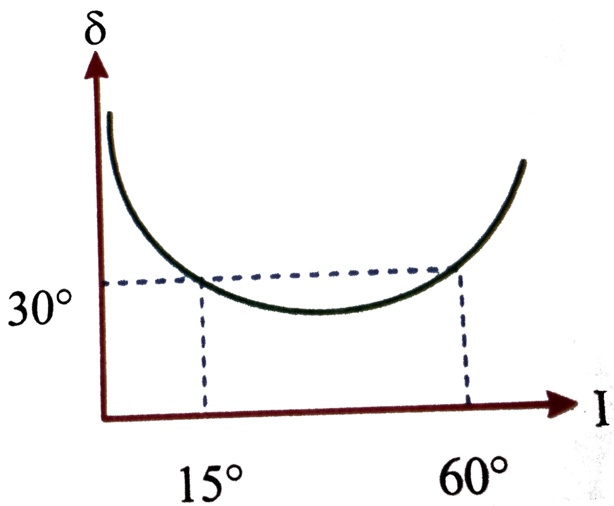
C. $\frac{\sqrt{3}}{2}$

D. $\frac{3}{2}$

Answer: B

Watch Video Solution

290. Figure shows the graph of angle of deviation ∂ versus angle of incidence i for a light ray striking a prism. The prism angle is



A. 30°

B. 45°

C. 60°

D. 75°

Answer: B

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291. In an experiment for determination of refractive index of glass of a prism by $i - \delta$, plot it was found thata ray incident at angle 35°, suffers a deviation of 40° and that it emerges at angle 79°. In that case which of the following is closest to the maximum possible value of the refractive index?

A. 1.5

B. 1.6

C. 1.7

D. 1.8

Answer: A

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292. As light enters from air into glass slab, its wavelength

A. increases

B. decreases

C. remains constant

D. may increases or decrease

Answer: B

Watch Video Solution

293. Travelling microscope is used for

A. determination of focal length of convex mirror

B. determination of focal length of convex lens

C. determination of refractive index of a prism

D. determination of refractive index of glass slab

Answer: D

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294. Refractive index of a medium depends on

A. wavelength

B. frequency

C. surrounding medium

D. size of the medium

Answer: A::C

Watch Video Solution

295. The absolute refractive index of a medium other than air is always

A. less than unity

B. equal to unity

C. more than unity

D. may be more or less than unity

Answer: C

Watch Video Solution

296. The refractive index of a material will be less than unity when

A. material is placed in optically rarer medium

B. material is placed in optically denser medium

C. material is placed in vaccum

D. material is placed in air

Answer: B

Watch Video Solution

297. If V_1 and V_2 are veloctities of light in two different media, then the ratio of wavelength of light in the same media $\frac{\lambda_1}{\lambda_2}=$

A. $\frac{V_1}{V_2}$

B. $\frac{V_2}{V_1}$

C. $\sqrt{V_1 V_2}$

D. $\sqrt{\frac{V_1}{V_2}}$

Answer: A

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298. In a travelling microscope, focal length of objective is

A. greater than focal length of eye- piece

B. smaller than focal length of eye- piece

C. equal to the focal length of eye- piece

D. zero

Answer: B

Watch Video Solution

299. In a travelling microscope, the final image is formed at

A. infinty

B. at the focus of eye-piece

C. at the focus of objective

D. at least distance of distinct vision from the eye-piece

Answer: D

Watch Video Solution

300. The vernier scale of a travelling microscope has 50 divisions which coincide with 49 main scale divisions. If each main scale division is $0.5mm$, the minimum inaccuracy in the measurement of distance is

A. $0.01cm$

B. $0.001cm$

C. $0.002cm$

D. $0.02cm$

Answer: B

Watch Video Solution

301. If t is the real thickness μ is refractive index of a glass slab then the shift of the image with refernce to the object is given by

A. $t[1-\mu]$

B. $t\left[1-\frac{1}{\mu}\right]$

C. $t[\mu-1]$

D. $t\left[\frac{1}{\mu}-1\right]$

Answer: B

Watch Video Solution

302. A ray of light passes normally through a slab $\mu = 1.5$ of thickness t. If the speed of light in vaccum be c, then time taken by the ray to go across the slab will be

A. $\frac{t}{c}$

B. $\frac{3t}{2c}$

C. $\frac{2t}{3c}$

D. $\frac{4t}{9c}$

Answer: B

Watch Video Solution

303. A ray of light incident on a transparent block at an angle of incident 60°. If the refractive index of the block is 1.732, the angle of deviation of the refracted ray is

A. 15°

B. 25°

C. 30°

D. 45°

Answer: C

Watch Video Solution

304. If a full wave reactifier circuit is operating from $50 Hz$ mains, the fundamental frequency in the ripple will be

A. $25 Hz$

B. $50 Hz$

C. $7.07 Hz$

D. $100 Hz$

Answer: D

Watch Video Solution

305. Avalanche breakdown in a semi conductor diode occurs when

A. the potential barrier becomes zero

B. the forward current exceeds a certain value

C. forward bias exceeds a certain value

D. reverse bias exceeds a certain value

Answer: D

Watch Video Solution

306. On increases the reverse biase to a large value of in a PN- junction diode, current.

A. increased gradually

B. increased suddenly

C. constant

D. decreased gradually

Answer: B

Watch Video Solution

307. Change in temperature

A. increases forward resistance

B. decreases forward resistance

C. affects $v - i$ characteristics of $p - n$ junction diode

D. does not affect $v - i$ characteristics of $p - n$ junction diode.

Answer: C

View Text Solution

308. The diffusion current in a p-n junction is

A. from $n-$ region to $p-$ region

B. from $p-$ region to $n-$ region

C. from $n-$ region to $p-$ region if the junction is forward biased and vice-versa if it is reverse biased

D. from $p-$ region to $n-$ region if the junction is reverse biased and vice-versa if it is reverse biased.

Answer: B

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309. Resistivity of a semiconductor depends on

A. shape of semiconductor

B. atomic nature of semiconductor

C. length of semiconductor

D. shape and atomic nature of semiconductor

Answer: B

Watch Video Solution

310. In V- I characteristics of $p - n$ junction in reverse biasing results in

A. leakeage current

B. the current which cannot be neglected

C. no flow of current

D. large current

Answer: A

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311. In the middle of the depletion layer of a reverse - biased $p-n$ junction , the

A. the potential is zero

B. the electric field is zero

C. the electric field is maximum

D. the potential is maximum

Answer: B

Watch Video Solution

312. In a $p-n$ junction diode having depletion layer of thickness $10^{-6}m$, the potential across it is $0.1V$. The electric field produced is

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313. In an unbaised $p-n$ junction diode electric field at the junction is of the order of

A. $10Vm^{-1}$

B. $10^{-6}Vm^{-1}$

C. $10^{6}Vm^{-1}$

D. $0.1Vm^{-1}$

Answer: C

Watch Video Solution

314. The resistance of an ideal $p-n$ junction diode in forward biased condition is

A. zero

B. infinite

C. negative

D. finite

Answer: A

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315. The value of current if diode is ideal is

A. 0

B. $1amp$

C. $1.66amp$

D. $15amp$

Answer: B

Watch Video Solution

316. The resistance of a revese biased $P - N$ junction diode is about

A. 1Ω

B. $10^2\Omega$

C. $10^3\Omega$

D. $10^6\Omega$

Answer: D

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317. Why does the width of depletion layer of a p-n junction increase in reverse biasing?

A. increases forward resistance

B. decreases

C. remains same

D. first increases and then decreases

Answer: A

Watch Video Solution

318. In a $p - n$ junction diode, the barrier potential opposes diffusion of

A. free electrons from n- region

B. holes from p- region

C. majority charge carriers from both the regions

D. minority charge carriers from both the regions

Answer: C

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319. The potential barrier in the depletion layer is due to

A. ions

B. electrons

C. holes

D. forbiden band

Answer: A

Watch Video Solution

320. Conductivity of a semiconductor increases when a radiation of wavelength is less than $2480 nm$ is incident on it. The forbidden gap is

A. $0.5 J$

B. $0.5 eV$

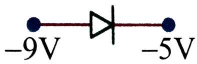
C. $1 eV$

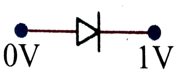
D. $2 eV$

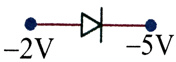
Answer: B

Watch Video Solution

321. Which of the following diodes is forward biases?

A. 1) 

B. 2) 

C. 3) 

D. 4) 

Answer: C

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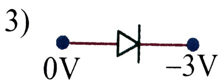
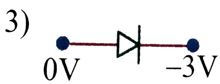
322. Which of the following diodes is reverse biased?

A. 

B. 

C. 

D. 

Answer: A

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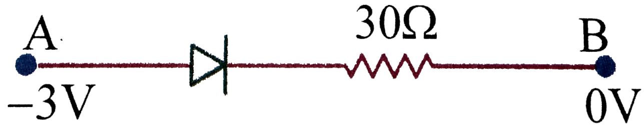
323. In the figure shown, current passing through the diode is



A. $0.1A$

B. $0.02A$

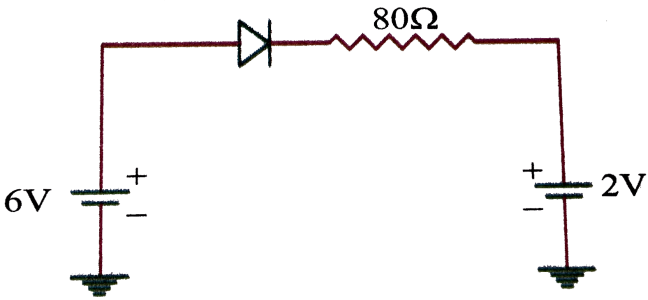
C. zero

D. $0.01A$

Answer: C

Watch Video Solution

324. The resitance of the diode in forward bias condition is 20Ω and infinity in the reverse biased condition. The current in the circuit is



A. $0.08A$

B. $0.1A$

C. $0.04A$

D. zero

Answer: C

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325. Zener diode is used as

A. half-wave rectifer

B. oscillator

C. voltage regulator

D. transformer

Answer: C

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326. Zener break down will occur if

A. impurity level is low

B. impurity level is high

C. impurity is less in n-side

D. impurity is less in p-side

Answer: B

Watch Video Solution

327. Zener diode is used as

A. rectification

B. stabilization

C. amplification

D. producing oscillations in an oscillator

Answer: B

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328. A zener diode when used as a voltage regulator is connected in

(i) forward bias

(ii) reverse bias

(iii) parallel with the load resistance

(iv) series with the load resistance

A. i and ii only are correct

B. ii and iii only are correct

C. only i is correct

D. only iv is correct

Answer: B

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329. Zener breakdown in a semi-conductor diode occurs when

A. forward current exceeds certain value

B. reverse bias exceeds a certain value

C. forward bias exceeds a certain value

D. the potential barrier is reduced to zero

Answer: B

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330. The sharp range of breakdown voltage in Zener diode is

A. 0.1 to $10V$

B. 1 to $20V$

C. 0.05 to $0.1V$

D. 20 to $200V$

Answer: C

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331. Zener diode will function more effectively in

A. forward bias

B. reverse bias

C. both forward and reverse bias

D. neither forward nor reverse bias

Answer: B

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332. In the breakdown region, Zener diode behaves as a

A. costant current source

B. constant voltage source

C. constant resistance source

D. constant power source

Answer: B

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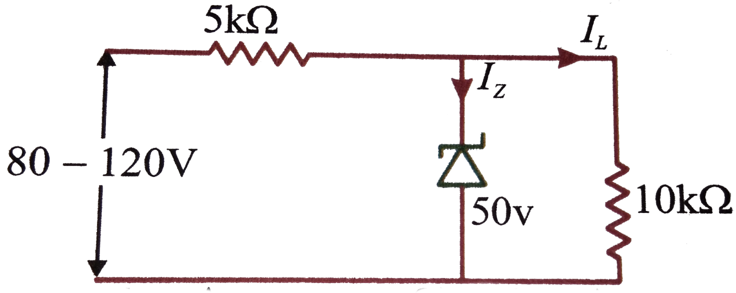
333. The maximum and minimum values of zener diode current are



A. $6mA, 5mA$

B. $14mA, 5mA$

C. $9mA, 1mA$

D. $3mA, 2mA$

Answer: C

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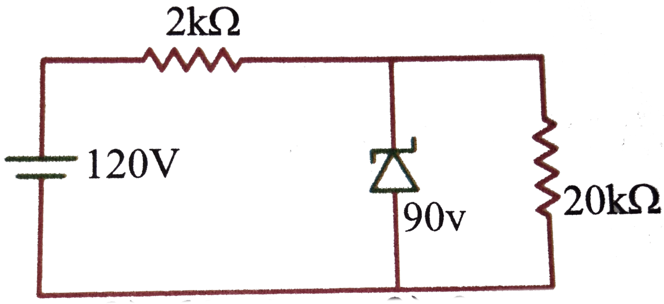
334. In the figure shown the potential drop across the series resistor is



A. $30V$

B. $60V$

C. $90V$

D. $120V$

Answer: A

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335. The zenar diode normally operates under reverse bias conditions, the major use of this fact is in the application s where was required

A. large value of current

B. a constant Voltage

C. A current that is increasing with out any in applied voltage

D. All the above

Answer: C

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336. In zenar diode the n-type and p-type sections are heavily doped as compared to noraml $p-n$ junction diode. This is made to ensure

A. Constant reverse break down voltage

B. low value of reverse breakdown voltage

C. high value of rseverse breakdown voltage

D. All the above statements are wrong

Answer: B

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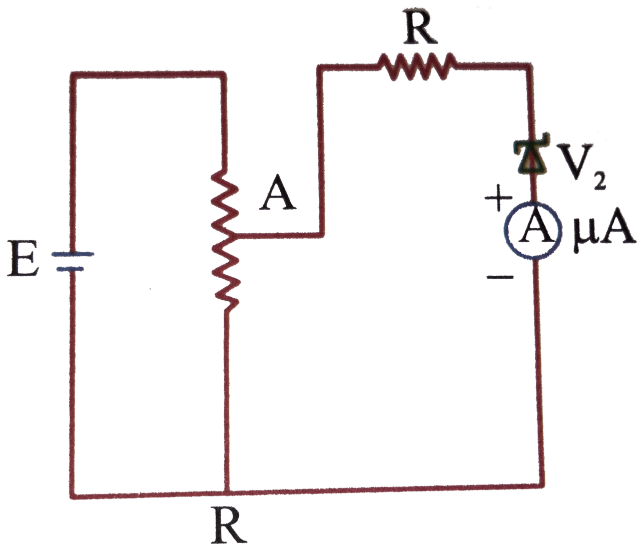
337. Zenar diode is operating the reverse bias the breakdown region for which the circuit diagram is as shown in the figure here take $V_z = 7V$ and $R = 10K\Omega$ For porential differe is equal to $8v$ across AD. What is the current through micrometer



A. $1000\mu A$

B. $1mA$

C. $10\mu A$

D. $100\mu A$

Answer: D

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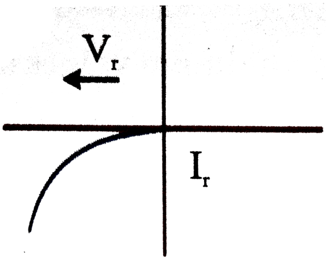
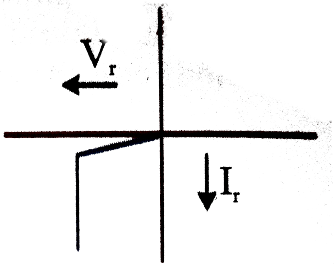
338. Identify the characterstics of a Zener diode

I)

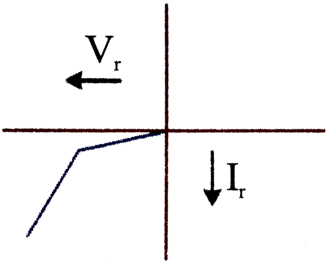


(1)

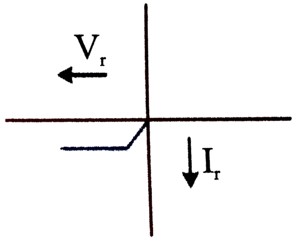
II)



III)



IV)



A. I

B. II

C. III

D. IV

Answer: B

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339. A zener diode is to be used as a voltage regulator. Identify the correct set up.

A. I

B. II

C. III

D. IV

Answer: A

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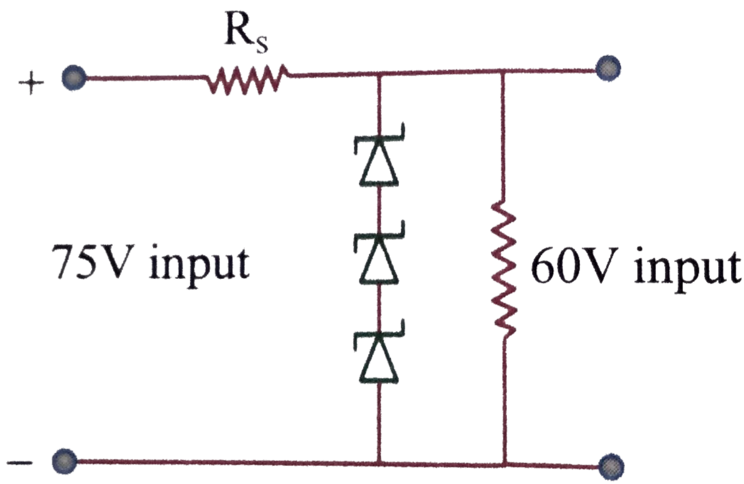
340. Value of R required for three, $10W$, $20V$, $1000mA$ zener diodes connected as shown is



A. 2.5Ω

B. 25Ω

C. 1.5Ω

D. 15Ω

Answer: B

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341. The number of depletion layers in a transistor is

A. 1

B. 2

C. 3

D. 4

Answer: B

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342. A npn transistor conducts when

A. collector is positive and emitter is negative with respect to base

B. collector is positive and emitter is at same potential as the base

C. both collector and emitter are negative with respect to the base

D. both collector and emitter are positive with respect to the base

Answer: C

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343. A transistor has a base current of $1mA$ and emitter current $100mA$. The current transfer ratio will be

A. 0.9

B. 0.99

C. 1.1

D. 10.1

Answer: B

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344. The relation between α and β of a transistor is

A. $\alpha = \beta + 1$

B. $\beta = \alpha + 1$

C. $\alpha = \beta(1 - \alpha)$

D. $\beta = \alpha(\beta - 1)$

Answer: C

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345. The voltage gain of a transistor is higher in the configuration of

A. common emitter

B. common base

C. common collector

D. all the three $(1, 2$ and $3)$

Answer: C

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346. At the base emitter junction of a transistor one finds

A. forward bias

B. narrow depletion layer

C. low resistance

D. all the three $(1, 2$ and $3)$

Answer: D

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347. In an NPN transistor the collector current is $24mA$. If 80% of electrons reach collector it base current in mA is

A. $35mA$

B. $25mA$

C. $15mA$

D. $6mA$

Answer: D

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348. A transistor is used in common-emitter configuration. Given its $\alpha = 0.9$. The change in collector current when the base current changes by $2mA$ is

A. $0.9mA$

B. $18mA$

C. $20mA$

D. $0.1 mA$

Answer: B

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349. Transistor acts like

A. oscillator

B. amplifier

C. both as oscillator and amplifier

D. a rectifier

Answer: C

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350. In common emitter transistor, the input resistance is 200Ω and bad resistance is $40k\Omega$. If current gain is 80 then voltage gain is

A. 16

B. 160

C. 1600

D. 16000

Answer: D

Watch Video Solution

351. Transistor means transfer of

A. current

B. voltage

C. resistance

D. all of these

Answer: C

Watch Video Solution

352. In a transistor the region which is heavily doped is

A. emitter

B. base

C. collector

D. all the three regions

Answer: A

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353. Transistor amplifier circuit with a feed back circuit is called

A. oscillator

B. detector

C. modulator

D. rectifer

Answer: A

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354. The value of current fain (α) in common base configuration is

A. $= 1$

B. < 1

C. > 1

D. ≥ 1

Answer: B

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355. The value of amplification factor (β) in common emitter configuration is

A. $= 1$

B. < 1

C. ≤ 1

D. > 1

Answer: D

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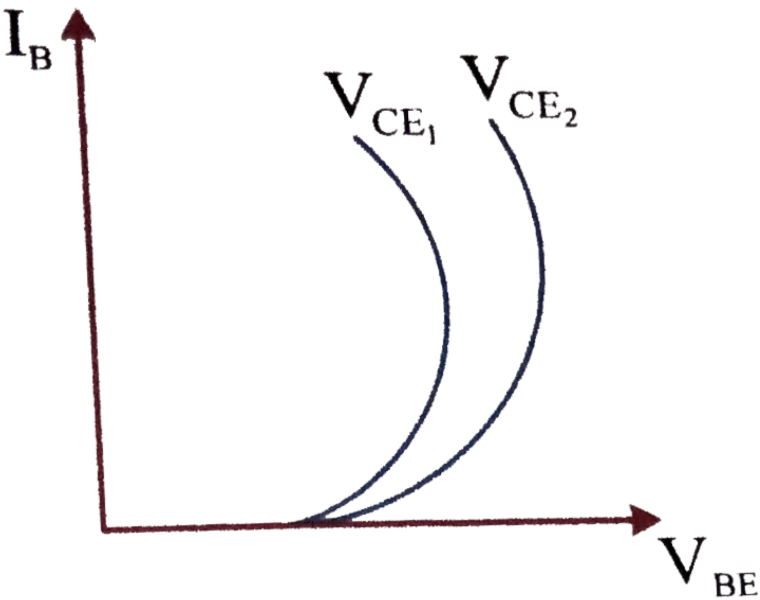
356. In put characterisitcs are shown. For CE configuration of $n-p-n$ transistor for different ouput voltages. Here



A. $V_{CE_1} > V_{CE_2}$

B. $V_{CE_1} = V_{CE_2}$

C. $V_{CE_1} < V_{CE_2}$

D. None of these

Answer: A

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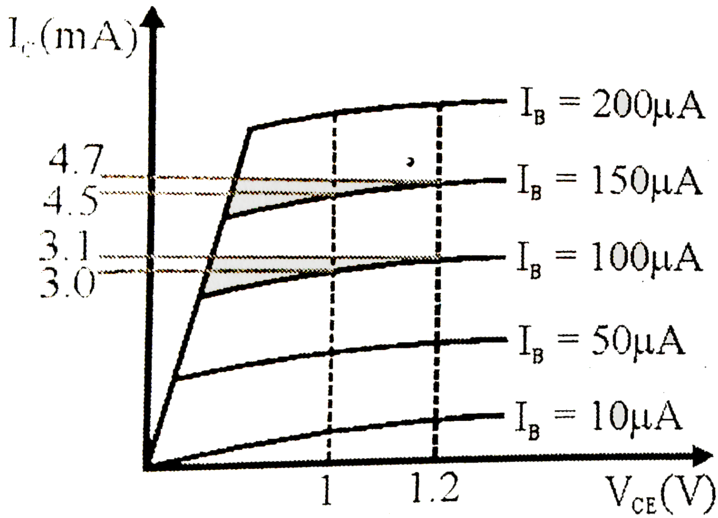

357.

Output characteristic of n-p-n transistor in CE configuration is shown. From the characteristic curve determine the current gain at $V_{CE} = 1V$-

A. 30

B. 32

C. 28

D. 40

Answer: A

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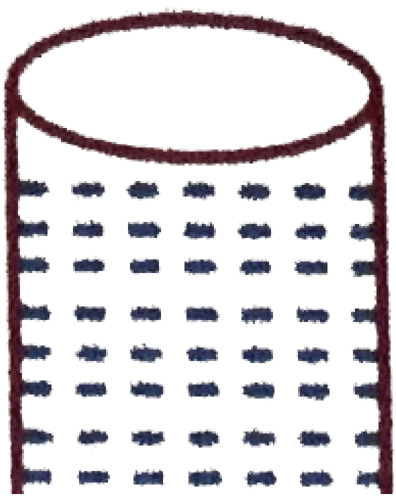
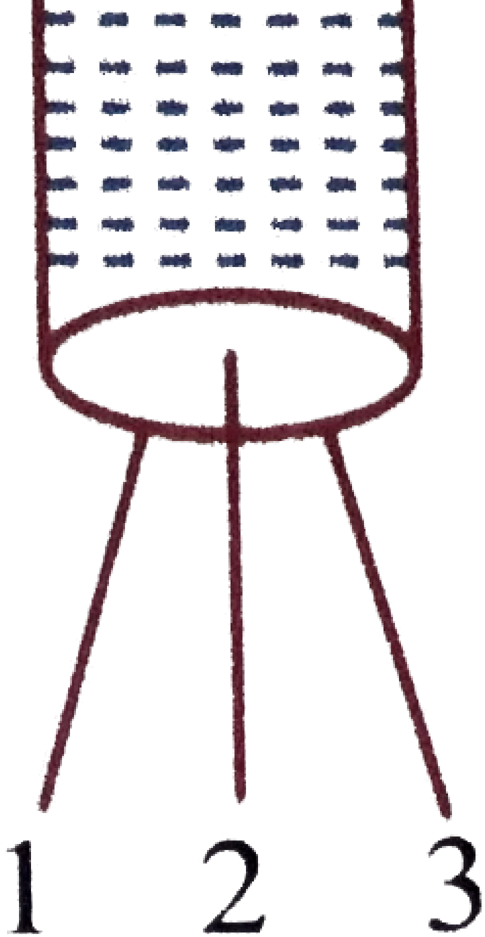
358. Consider the transistor shown in figure, its terminals are marked as 1, 2 and 3 using multimeter one try to identify the base of transistor he proceed in the way as follows

Experiment 1: He touches the common lead of the mulimeter to 2 then on touching other lead of miltimeter of 1 he hasn't got any becp(indication of conduction)but when connected to 3got the beep

Experiment II : He connects the common lead of multimeter to 1 and other lead to 2 and 3 turn by turn then in this case he got beep for both connections. From this we conclude that





A. 1 is base

B. 2 is base

C. 3 is base

D. None of these

Answer: A

View Text Solution

359. A multimeter is a device which cannot be used as

A. an ammeter

B. a voltmeter

C. an ohmmeter

D. a magnetometer

Answer: D

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360. An LED operates under the condition of

A. reverse bias

B. forward bias

C. both in forward and reverse bias

D. no biasing.

Answer: B

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361. Which of the following is not a two legged device?

A. resistor

B. capacitor

C. p-n junction diode

D. intergrated circuit

Answer: D

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362. Which of the following is not used to making $LEDs$?

A. $GaAs$

B. Cds

C. GaP

D. $GaAsP$

Answer: B

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363. Silicon and Germanium p-n junction diodes are not used for making $LEDs$

A. as their energy band gap is very large

B. as their energy band gap is very small

C. as greater percentage of energy is in the form of heat

D. as there is no energy gap in them

Answer: C

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364. The main precaution while connecting LED is

A. it is should always be reverse biased

B. it is should always be forward biased

C. it is should never be reverse biased

D. both 2 and 3

Answer: C

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365. Which one of the following circuit elements is an active component ?

A. resistor

B. capacitor

C. transistor

D. inductor

Answer: C

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366. In case of an IC, the pin number is counted with respect to a tap provided on it

A. clockwise

B. anticlockwise

C. alternately

D. diagonally

Answer: B

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367. Multimeter used for AC measurement of

A. bridge rectifier

B. $p - n - p$ transistor

C. $n - p - n$ transistor

D. LDR

Answer: A

Watch Video Solution

368. Which of the follwing devices work on AC as well as DC?

A. LED

B. resistor

C. diode

D. capacitor

Answer: B

Watch Video Solution

369. Which is not the function of analong multimeter?

A. to identify the base of a transistor

B. to identify the terminals of an IC

C. to measure the temperature gradient

D. to check whether the given electronic component is in working order or not

Answer: C

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370. The arrow in a given transistor indicates

A. direction of flow of electrons

B. direction of flow of holes

C. both the directions of flow of holes and electrons

D. neither the direction of flow of holes nor of electrons

Answer: B

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371. The correct relation between current gain, resistance gain and power gain is

A. power gain $=$ (current gain)(resistance gain)

B. power gain $= (\text{current gain})^2(\text{resistance gain})$

C. power gain $= \dfrac{(\text{current gain})^2}{(\text{resistance gain})}$

D. power gain $= \dfrac{\text{current gain}}{(\text{resistance gain})^2}$

Answer: B

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372. Digital multimeters use the following component for display

A. transistor

B. p-n junction diode

C. LED

D. all of these

Answer: C

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373. Multimeter is used as a voltmeter when

A. low resistance is connected in parallel to a galvanometer

B. high resistance is connected in parallel to a galvanometer

C. low resistance is connected in series to a galvanometer

D. high resistance is connected in series to a galvanometer

Answer: D

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374. In electronic industry, now-a-days Carbon resistors gaining popularity have percentage accuaracy as

A. 20%

B. 10%

C. 5%

D. 2%

Answer: D

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375. Carbon resistors commonly used in electronic circuits are made of

A. copper and carbon

B. magnesium and carbon

C. carbon and clay

D. carbon and constantan

Answer: C

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376. When a multimeter is connected to a transistor, it conducts when

A. base-emitter is forward biased

B. base-collector is forward biased

C. base-emitter is reverse biased

D. base-collector is reverse biased

Answer: A

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377. A digital multimeter when used as a continuity tester

A. it is put in the lowest resistance range

B. it is put in the highest resistance range

C. it gives a beep

D. it will be put off

Answer: C

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378. A digital multimeter consists of the following component

A. an amplifier

B. analog to digital converter

C. numeric / a-numeric digital display

D. all of these

Answer: D

Watch Video Solution

379. To identify whether the transistor is working or not using multimeter, which statement serves the purpose?

A. The common lead of multimeter is connected to a base and other lead to first emitter and then to collector only $1st$ connections shows the continuity

B. The common lead of multimeter is connected to a base and other lead to first emitter and then to collector only both connections shows the continuity

C. The common lead of multimeter is connected to a base and other lead to first emitter and then to collector none of the connections shows the continuity

D. all of these

Answer: D

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Level-v(Single answer)

1. The length of a rectangular plate is measured by a meter scale and is found to be $10.0 cm$. Its width is measured by vernier callipers as $1.00 cm$. The least count of the meter scale and vernier calipers are $0.1 cm$ and $0.01 cm$ respectively. Maximum permissibe error in area measurement is.

A. $\pm 0.2 cm^2$

B. $\pm 0.1 cm^2$

C. $\pm 0.3 cm^2$

D. zero

Answer: A

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2. In the previous question, minimum possible error in area measurement can be.

A. $\pm 0.2 cm^2$

B. $\pm 0.1 cm^2$

C. $\pm 0.3 cm^2$

D. zero

Answer: D

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3. To estimate g (from $g = 4\pi^2 \frac{L}{T^2}$), error in measurement of L is $\pm 2\,\%$ and error in measurement of $T is \pm 3\,\%$ The error in estimated g will be

A. $\pm 8\,\%$

B. $\pm 6\,\%$

C. $\pm 3\,\%$

D. $\pm 5\,\%$

Answer: A

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4. The dimensions of a rectangular block measured with a vernier callipers having least count of $0.1mm$ is $5mm \times 10mm \times 5mm$. The maximum percentage error in measurement of volume of the blcok is

A. 5%

B. 10%

C. 15%

D. 20%

Answer: A

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5. The massofaball is $1.76kg$. The mass of 25 such balls is

A. $0.44 \times 10^3 kg$

B. $44.0kg$

C. $44kg$

D. $44.00kg$

Answer: B

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6. In Ohm's law experiment, potential drop across a resistance was measured as $v = 5.0$ volt and current was measured as $i = 2.00 amp$. Find the maximum permissible error in resistance.

A. $1.5\ \%$

B. $2.5\ \%$

C. $1\ \%$

D. $5\ \%$

Answer: B

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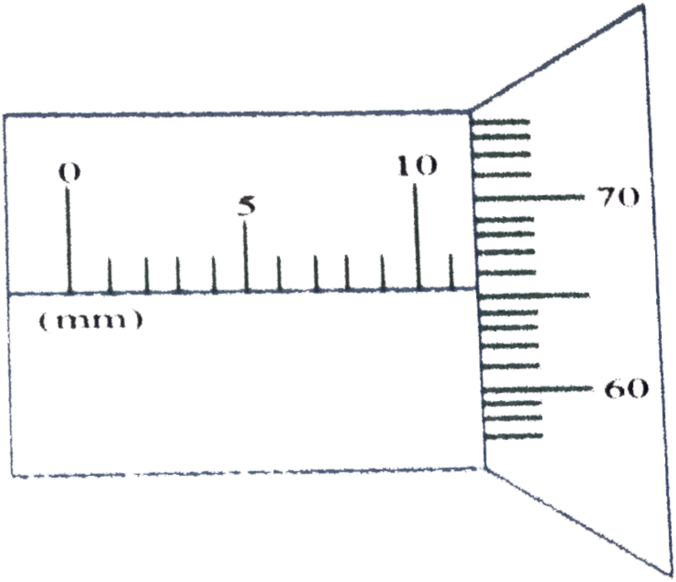
7. Read the normal screw gauge main scale has only mm marks. Circular scale has 100 division. In complete rotation, the screw advances by $1mm$.



A. $11mm$

B. $11.65mm$

C. $11.650mm$

D. $11.6mm$

Answer: B

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8. In a complete rotation, spindle of a screw gauge advances by $\frac{1}{2}mm$. There are 50 divisions on circular scale. The main scale has $\frac{1}{2}mm$ marks to (is graduated to $\frac{1}{2}mm$)

If a wire is put between the jaws, 3 main scale divisions are clearly visible, and $20th$ division of circular scale coincides with reference line. Find diameter of wire in correct significant figures.

A. $1.7mm$

B. $1.70mm$

C. $3.40mm$

D. $3.20mm$

Answer: B

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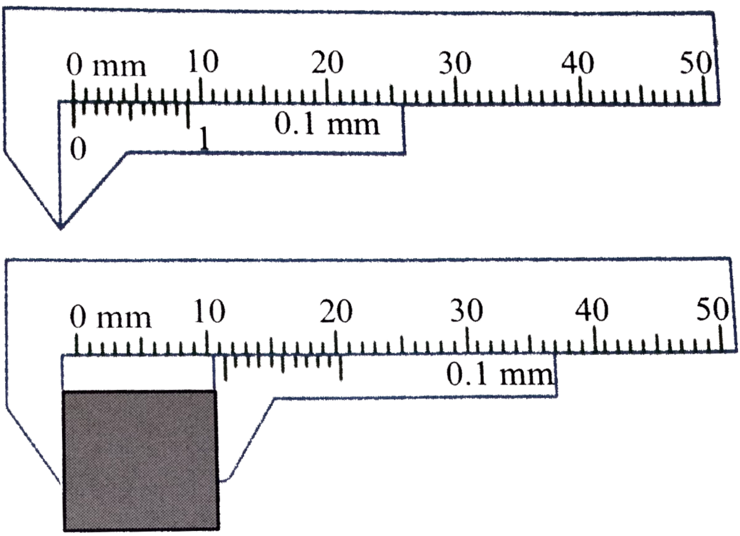
9. Find the thickness of the object using the defected vernier callipers



A. $11.4mm$

B. $14.6mm$

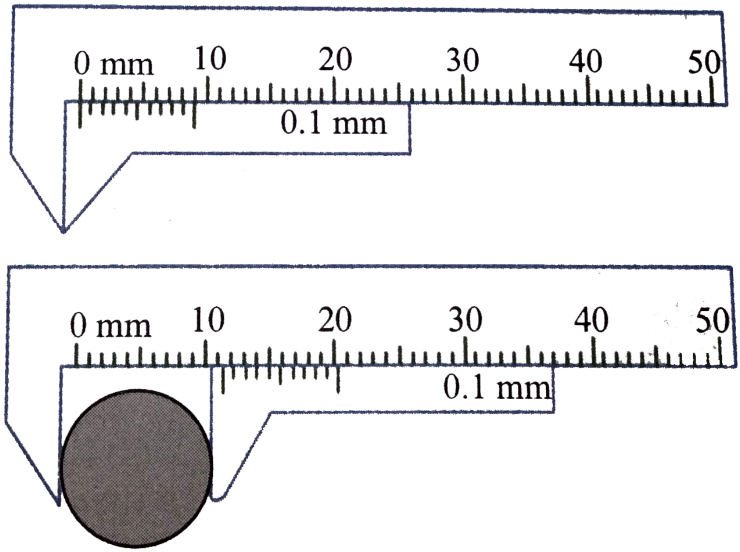
C. $15.2mm$

D. $15.20mm$

Answer: A

Watch Video Solution

10. Calculate thickness of the object



A. $11.8mm$

B. $12.0mm$

C. $11.4mm$

D. $11.2mm$

Answer: C

Watch Video Solution

11. The main scale of a vernier callipers reads $10mm$ in 10 divisions. Ten divisions of vernier scale coincide with nine divisions of the main scale. When the two jaws of the callipers touch each other, the fifth division of the vernier coincides with 9 main scale divisions and zero of the vernier is to the right of zero of main scale, when a cylinder is tighty placed between the two jaws, the zero of the vernier scale lies slighty to the left of $3.2cm$ and the fourth vernier division coincides with a main scale division. Find diameter of the cylinder.

A. $3.09cm$

B. $3.14cm$

C. $3.04cm$

D. None of these

Answer: A

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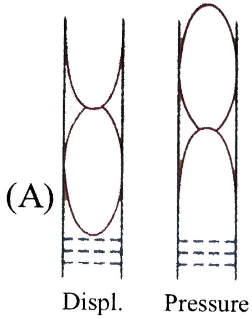
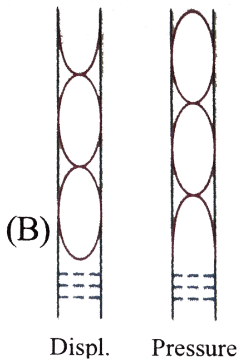
12. For the third resonance, which option shows correct mode shaoe for displacement variation and pressure variation.

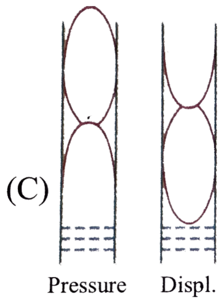
A.


(A)
Displ.
Pressure

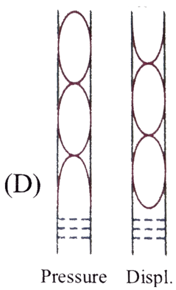
B.


(B)
Displ.
Pressure

C.


(C)
Pressure
Displ.

D.


(D)
Pressure
Displ.

Answer: B

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13. A cube has a side of length $1.2 \times 10^{-2}m$. Calculate is volume:

A. $1.7 \times 10^{-6}m^3$

B. $1.73 \times 10^{-6}m^3$

C. $1.70 \times 10^{-6}m^3$

D. $1.732 \times 10^{-6}m^3$

Answer: A

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14. A wire of length $l = 6 \pm 0.06 cm$ and radius $r = 0.5 \pm 0.005 cm$ and $m = 0.3 \pm 0.003 g$. Maximum percentage error in density is:

A. 4

B. 2

C. 1

D. 6

Answer: A

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15. A screw gauge having 100 equal division and a pitch of length $1mm$ is used to measue the diameter of a wire of length $5.6cm$. The main scale reading is $1mm$ and 47^{th} circular division coincides with the scale. Find the curved surface area of wire in cm^2 to appropriate significant fihure.

$$\left(use\pi = \frac{22}{7}\right.$$

A. $2.1cm^2$

B. $2.6cm^2$

C. $5.2cm^2$

D. $1.3cm^2$

Answer: B

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16. In a screw gauge, the zero of mainscale coincides with fifth division of circular scale in figure (i). The circular division of screw gauge are 50. It moves $0.5mm$ on main scale In one rotation. The diameter of the ball in figure (ii) is

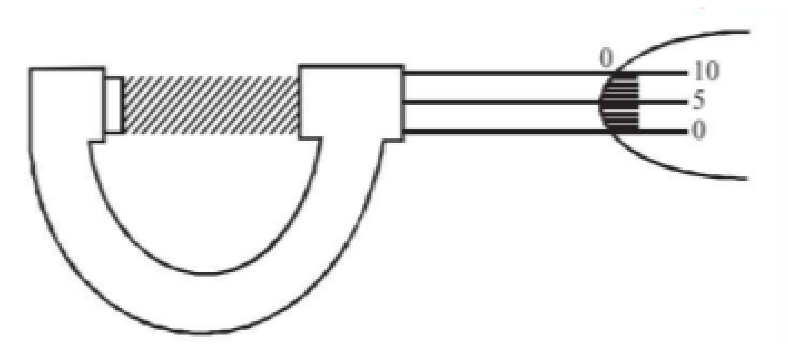

Figure (i)

A. $2.25mm$

B. $2.20mm$

C. $1.20mm$

D. $1.25mm$

Answer: C

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17. If n^{th} division of main scale coincides with $(n+1)^{th}$ divisions of vernier scale. Given one main scale division is equal to 'a' units. Find the least count of the vernier.

A. $\dfrac{a}{n+1}$

B. $\dfrac{n+1}{a}$

C. $\frac{n}{a}$

D. n

Answer: A

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18. The side of a cube is measured by vernier callipers (10 divisions of a vernier scale coincide with 9 divisions of main scale, where 1 division of main scale is $1mm$). The main scale reads $10mm$ and first division of vernier scale coincides with the main scale. Mass of the cube is $2.736g$. find the density of the cube in appropriate significant figures.

A. $1.33gm / cm^3$

B. $0.66gm / cm^3$

C. $2.66gm / cm^3$

D. $4.88gm / cm^3$

Answer: C

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19. Student $I, II,$ and III perform an experiment for measuring the acceleration due to gravity (g) usinf a simple pendulum. They use lengths of the pendulum and // or record time for different number of oscillations . The observations are shown in the following table . Least count for length $= 0.1cm$

Student	Length of Pendulam (cm)	Number of n Oscillation (n)	Time Period (s)
I	64.0	8	16.0
II	64.0	4	16.0
III	20.0	4	9.0

Least count for time $= 0.1s$.

If E_I, E_{II} , and E_{III} are the percentage errors in g , i.,e., $\left(\frac{\Delta g}{g} \times 100\right)$ for students I,II , and III, respectively , then

A. $E_I = 0$

B. E_1 is minimum

C. $E_I = E_{II}$

D. E_{II} is maximum

Answer: B

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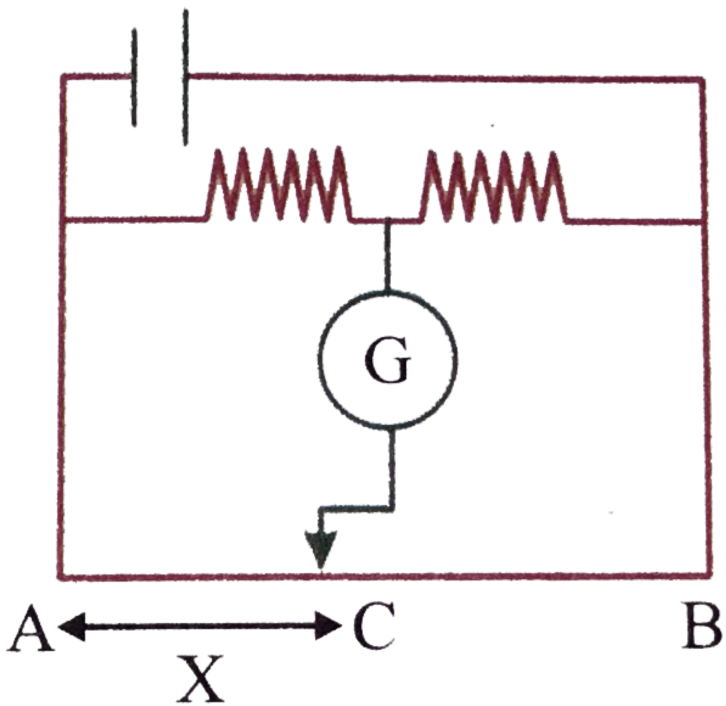
20. In the given circuit, no current is passing through the galvanometer. If the cross sectional diameter of the wire AB is doubled, then for null point of galvanometer, the value of AC would be:



A. $2X$

B. X

C. $\frac{X}{2}$

D. $3X$

Answer: B

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21. The pitch of a screw gauge is $0.55mm$ and there are 100 divisions on its circular scale. The instrument reads $+2$ divisions when nothing is put in between its jaws. In measuring the diameter of a wire, there are 8 divisions on the main scale and 83^{rd} division coincides with the reference. Then the diameter of the wire is

A. $4.05mm$

B. $4.405mm$

C. $3.5mm$

D. $1.25mm$

Answer: B

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22. The pitch of a screw gauge having 50 divisions on its circular scale is $1mm$ When the two jaws of the screw gauge are in contact with each other, the zero of the circular scale lies 6 divisions below the line of gradution. when a wire is placed between the jaws, 3 linear scale divisions are clearly visible while 31 division on the circular scale coincides with the reference line. Find diameter of the wire.

A. $3.62mm$

B. $3.50mm$

C. $3.5mm$

D. $3.74mm$

Answer: B

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23. The smallest division on the main scale of a vernier callipers is $1mm$, and 10 vernier divisions coincide with 9 mainn scalel divisions. While measuring the diameter of a spehre the zero mark of the vernier scale lies between 2.0 and 2.1 cm and the fifth division of hte vernier main scale coincide with a main scale division. Then diameter of the sphere is

A. $2.05cm$

B. $3.05cm$

C. $2.50cm$

D. None of these

Answer: A

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Multiple answer

1. While finding specific heat capacity using calorimeter, error might occur due to:

A. Absence of water equivalent

B. Absence of heat loss reducing covers.

C. Presence of stirrer

D. Absence of stirrer

Answer: A::B

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2. In Searle's apparatus:

A. One wire is reference wire.

B. Load cannot be increased beyond limit of elasticity

C. Spirit level should be adjusted for each reading

D. No Vernier scale is used

Answer: A::B::C

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3. A student uses a simple pendulum of exactly $1m$ length to determine g, the acceleration due ti gravity. He uses a stop watch with the least count of $1\,\sec$ for this and record $40\,\sec onds$ for 20 oscillations for this observation, which of the following statement $(s) is (are)$ true?

A. Error ΔT in measuring T, the time period, is 0.05 seconds

B. Error ΔT in measuring T, the time period, is 1 second

C. Percentage error in the determination of g is $5\,\%$

D. Percentage error in the determination of g is

2.55%

Answer: A::C

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4. If S and V are one main scale and one Vernier scale and $n-1$ divisions on the main scale are equivalent to n divisions of the Vernier , then

A. Least count is S/n

B. Vernier constant is S/n

C. The same vernier constant can be used for circular verniers also

D. The same vernier constant cannot be used for circular verniers.

Answer: A::B::C

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5. In a resonance tube apparatus, the first and second resonance lengths are l_1 and l_2 respectively. If v is the velocity of wave. Then

A. Frequency is , $u = \frac{V}{2(l_2 - l_1)}$

B. End correction , is $e = \frac{l_2 - 3l_1}{2}$

C. End correction is, $e = \frac{l_2 - 3l_1}{2}$

D. Frequency is , $u = \frac{V}{4(l_2 - l_1)}$

Answer: A::B

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6. The pitch of a screw-gauge having 50 divisions on its circular scale is $1mm$. When the two jaws of the screw gauge are in contact with each other, 47^{th} division of circular scale is on the reference line. When a wire is placed between the jaws. 3 linear scale divisions are clearly visible while $31st$ division on the circular scale coincides with the refference line. Then

A. Zero error in the screw gause is -0.94

B. Zero error in the screw gause is $-0.06mm$

C. diameter of the wire is $3.68mm$

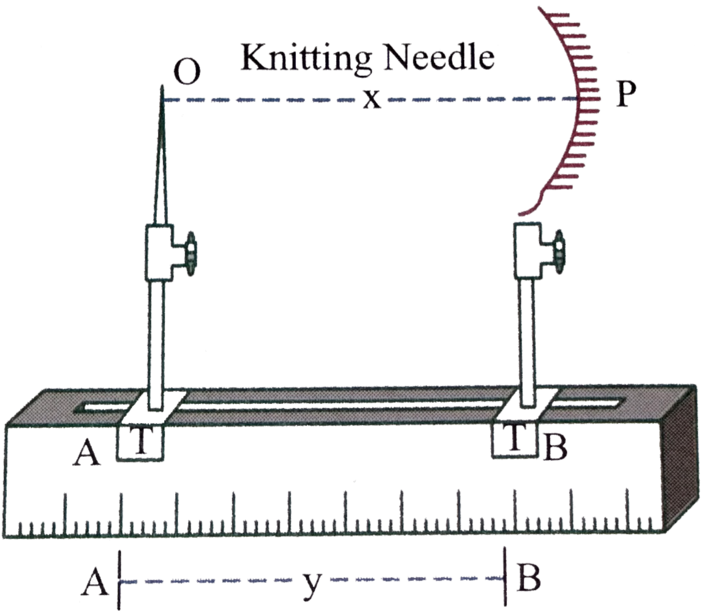
D. diameter of the wire is $3.56mm$

Answer: B::C

Watch Video Solution

Passage

1. In $u - v$ method, we require the distance between object or image from the pole (vertex) of the mirror (actual distance). But practically we measure the distance between the indices A and B. (Observed distance). Which need not exactly co-inside with object and pole, there can be a slight mismatch called index error, which will be constant for every observation.



Determination of index correction

Index error=Observed distance-Actual distance(Just like zero error in screw guage, it is the excess reading).

To determine index error, mirror and object needle and placed at arbitary position. For measuring actual distance, a knitting needle is just fitted between the pole of mirror and object needle O. The length of knitting needle will give the actual object distance while the seperation between indices A and B at that instant is the observed distance.

So index error is-

$e =$ Observed distance-Actual distance

$=$ Separation between indices A and B- Length of knitting neddle once we get e, in

every observation, we get

Actual distance=Observed distance (separation between the indices)- Excess reading(e) There is an another term, Index corraction which is invert of index error.

Index correction=-index error

To find index error for u, when a knitting needle of length $20.0cm$ is adjusted between pole and object needle, the sepertion between the indices of object needle and mirror was observed to be $20.2cm$. Index corraction for u is

A. $-0.2cm$

B. $0.2cm$

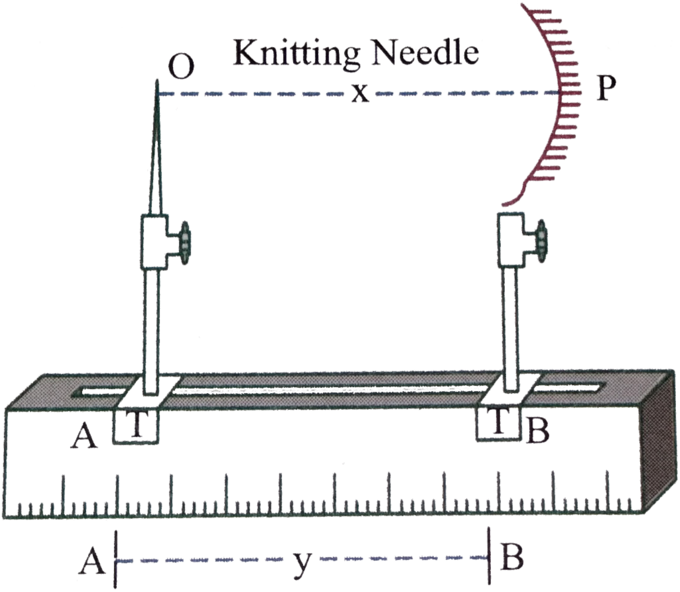
C. $-0.1cm$

D. $0.1cm$

Answer: B

Watch Video Solution

2. In $u - v$ method, we require the distance between object or image from the pole (vertex) of the mirror (actual distance). But practically we measure the distance between the indices A and B. (Observed distance). Which need not exactly co-inside with object and pole, there can be a slight mismatch called index error, which will be constant for every observation.



Determination of index correction

Index error=Observed distance-Actual distance(Just like zero error in screw guage, it is the excess reading).

To determine index error, mirror and object needle and placed at arbitary position. For measuring actual distance, a knitting needle is just fitted between the pole of mirror and object needle O. The length of knitting needle will give the actual object distance while the seperation between indices A and B at that instant is the observed distance.

So index error is-

$e =$ Observed distance-Actual distance

$=$ Separation between indices A and B- Length of knitting neddle once we get e, in every observation, we get

Actual distance=Observed distance (separation between the indices)- Excess reading(e) There is an another term, Index corraction which is invert of index error.

Index correction=-index error

To find index error for v, when the same knitting needle is adjusted between the pole and the image needle, the separation between the indices of image needle and mirror was found to be $19.9cm$. Index error for v is

A. $0.1cm$

B. $-0.1cm$

C. $0.2cm$

D. $-0.2cm$

Answer: B

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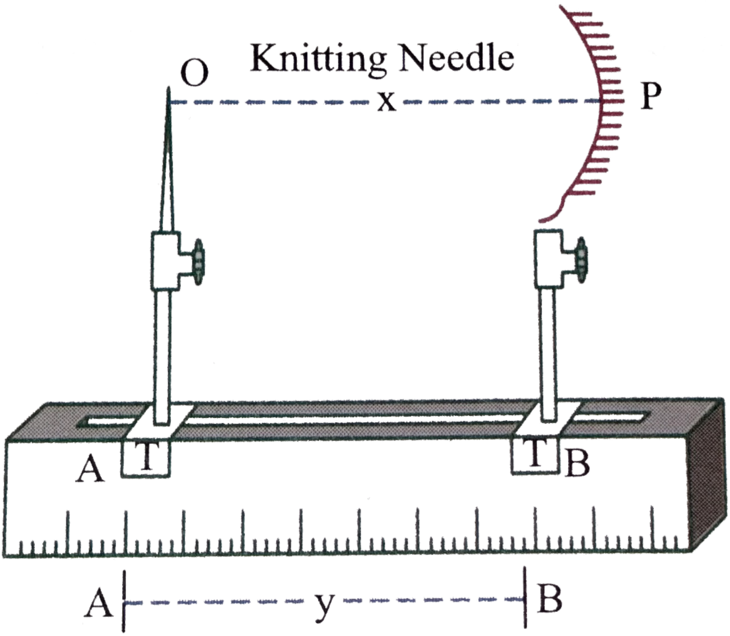
3. In $u - v$ method, we require the distance between object or image from the pole (vertex) of the mirror (actual distance). But practically we measure the distance between the indices A and B. (Observed distance). Which need not exactly co-inside with object and pole, there can be a slight mismatch called index error, which will be constant for every observation.



Determination of index correction

Index error=Observed distance-Actual distance(Just like zero error in screw guage, it is the excess reading).

To determine index error, mirror and object needle and placed at arbitary position. For measuring actual distance, a knitting needle is just fitted between the pole of mirror and object needle O. The length of knitting needle will give the actual object distance while the seperation between indices A and B at that instant is the observed distance.

So index error is-

$e =$ Observed distance-Actual distance

$=$ Separation between indices A and B- Length of knitting neddle once we get e, in

every observation, we get

Actual distance=Observed distance (separation between the indices)- Excess reading(e) There is an another term, Index corraction which is invert of index error.

Index correction=-index error

In some observation, the observed object distance (Separation between indices of object needle and mirror) is $30.2cm$, and the observed image distance is $19.9cm$. Using index correction from previous two equations, estimate the focal distance of the concave mirror!

A. $36cm$

B. $20cm$

C. $12cm$

D. $8cm$

Answer: C

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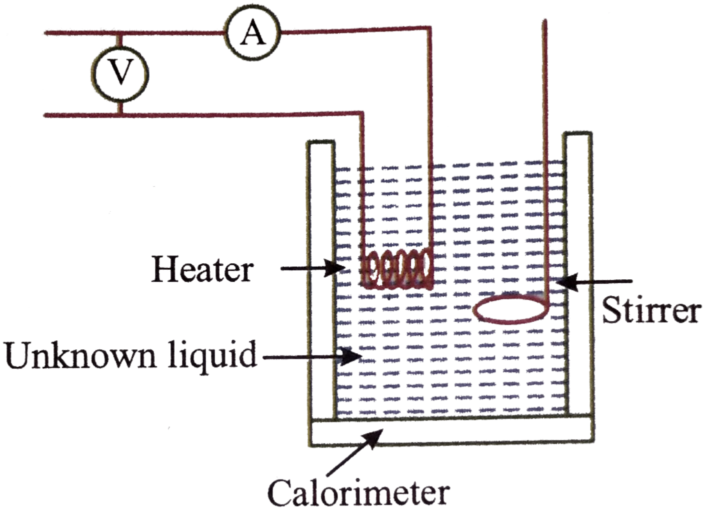
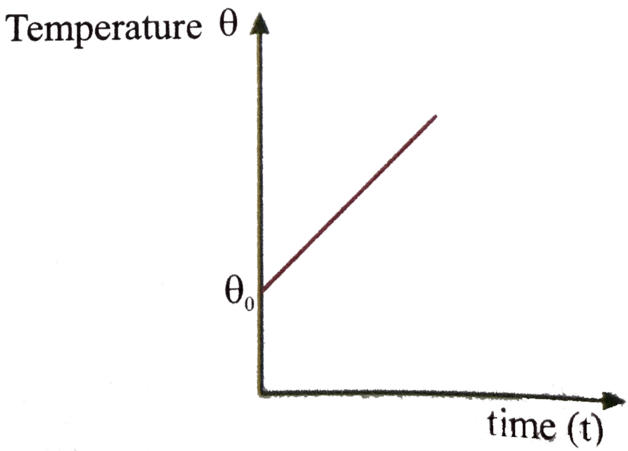
4. Figure shows an electrical calorimeter to determine specific heat capacity of an unknown liquid, First of all, the mass of empty calorimeter (a copper container) is measured and suppose it is m_1. Then the unknown liquid is poured in it. Now the combined mass of calorimeter+liquid system is measured and let it be m_2. So the mass of liquid is $(m_2 - m_1)$. Initially both were at room temperature (θ_0).

Now a heater is immeresed in if for time interval t. The voltage drop across the heater is V and current passing through it is I. Due to heat supplied, the temperature of both the liquid and calorimeter will rise simultaneously. After t sec, heater was switched off, and final temperature is θ_r. If there is no heat loss to surroundings. Heat supplied by the heater=Heat absorbed by the liquid+heat absorbed by the calorimeter

$$(VI)t = (m_2 - m_1)S_1(\theta_f - \theta_0) + m_1 S_c(\theta_f - \theta_0)$$

The specific heat of the liquid $S_1 = \dfrac{\frac{(VI)t}{\theta_f - \theta_0} - m_1 S_c}{(m_2 - m_1)}$





Radiation correction: There can be heat loss to environment. To compensate this loss, a correction is introduced.

Let the heater was on for t sec, and then it is switched off. Now the temperature of the mixture falls due to heat loss to environment. The temperature of the mixture is measured $t/2\,\text{sec.}$ after switching off. Let the fall in temperature during this time is ε

Now the corrected final temperature is taken as

$\theta_f = \theta_f + \varepsilon$

In this experiment voltage across the heater is $100.0V$ and current is $10.0A$, and heater was switched on for $t = 700.0\,\text{sec.}$ Initially all elements were at room temperature $\theta_\circ = 10.0^\circ C$ and final temperature was measured as $\theta_f = 73.0^\circ C$.

Mass of empty calorimeter ws $1.0kg$ and the combined mass of calorimeter + liquid is $3.0kg$. The specific heat capacity of the calorimeter $= 3.0 \times 10^3 J/kg^\circ C$. The falls in temperature 350 second after switching off the heater was $7.0^\circ C$. Find the specific heat capacity of the unknown liquid in proper significant figures.

A. $3.5 \times 10^3 J/kg^\circ C$

B. $3.50 \times 10^3 J/kg^\circ C$

C. $4.0 \times 10^3 J/kg^\circ C$

D. $3.500 \times 10^3 J/kg^\circ C$

Answer: A

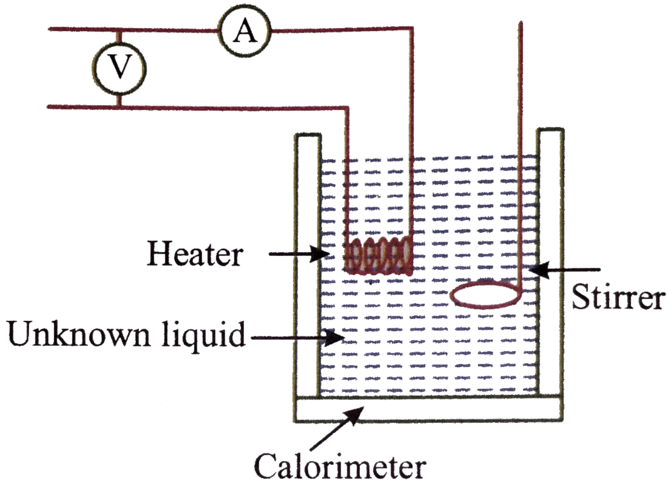
View Text Solution

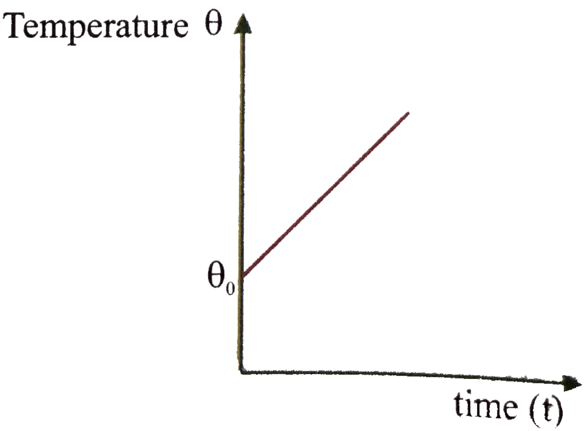
5. Figure shows an electrical calorimeter to determine specific heat capacity of an unknown liquid, First of all, the mass of empty calorimeter (a copper container) is measured and suppose it is m_1. Then the unknown liquid is poured in it. Now the combined mass of calorimeter+liquid system is measured and let it be m_2 . So the mass of liquid is $(m_2 - m_1)$. Initially both were at room temperature (θ_0).

Now a heater is immeresed in if for time interval t. The voltage drop across the heater is V and current passing through it is I. Due to heat supplied, the temperature of both the liquid and calorimeter will rise simultaneously. After $t\,\mathrm{sec}$, heater was switched off, and final temperature is θ_r. If there is no heat loss to surroundings. Heat supplied by the heater=Heat absorbed by the liquid+heat absorbed by the calorimeter

$$(VI)t = (m_2 - m_1)S_1(\theta_f - \theta_0) + m_1 S_c(\theta_f - \theta_0)$$

The specific heat of the liquid $S_1 = \dfrac{\dfrac{(VI)t}{\theta_f - \theta_0} - m_1 S_c}{(m_2 - m_1)}$





Radiation correction: There can be heat loss to environment. To compensate this loss, a correction is introduced.

Let the heater was on for $t\,\text{sec}$, and then it is switched off. Now the temperature of the mixture falls due to heat loss to environment. The temperature of the mixture is measured $t/2\,\text{sec.}$ after switching off. Let the fall in temperature during this time is ε

Now the corrected final temperature is taken as

$\theta_f = \theta_f + \varepsilon$

If mass and specific heat capacity of calorimeter is negligible, what would be maximum permissible error in S_l. Use the date mentioned below.

$m_1 \rightarrow, S_l \rightarrow 0, m_2 = 1.00kg,$

$V = 10.0V, I = 10.0A,$

$t = 1.00 \times 10^2\,\text{sec}, \theta_0 = 15^\circ C,$

Corrected $\theta_1 = 65^\circ C$

A. 4%

B. 5%

C. 8%

D. 12%

Answer: C

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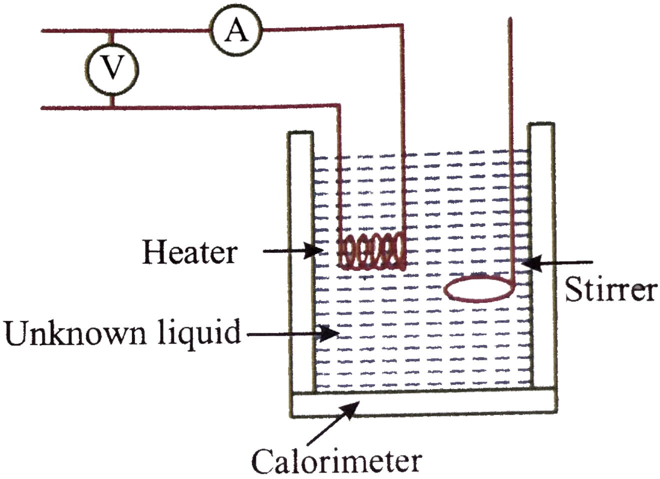
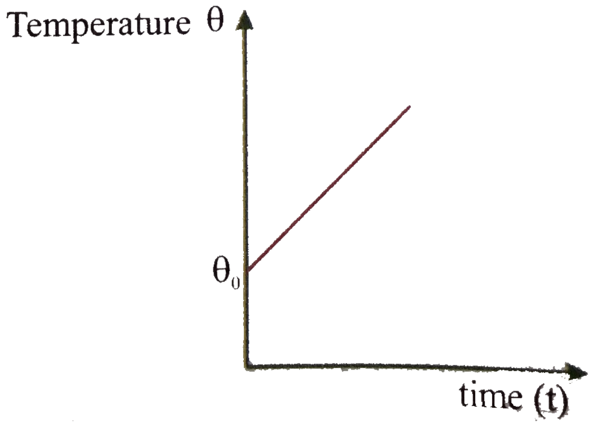
6. Figure shows an electrical calorimeter to determine specific heat capacity of an unknown liquid, First of all, the mass of empty calorimeter (a copper container) is measured and suppose it is m_1. Then the unknown liquid is poured in it. Now the combined mass of calorimeter+liquid system is measured and let it be m_2. So the mass of liquid is $(m_2 - m_1)$. Initially both were at room temperature (θ_0).

Now a heater is immeresed in if for time interval t. The voltage drop across the heater is V and current passing through it is I. Due to heat supplied, the temperature of both the liquid and calorimeter will rise simultaneously. After t sec, heater was switched off, and final temperature is θ_r. If there is no heat loss to surroundings. Heat supplied by the heater=Heat absorbed by the liquid+heat absorbed by the calorimeter

$$(VI)t = (m_2 - m_1)S_1(\theta_f - \theta_0) + m_1 S_c(\theta_f - \theta_0)$$

The specific heat of the liquid $S_1 = \dfrac{\frac{(VI)t}{\theta_f - \theta_0} - m_1 S_c}{(m_2 - m_1)}$





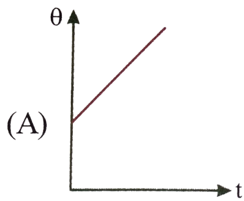
Radiation correction: There can be heat loss to environment. To compensate this loss, a correction is introduced.

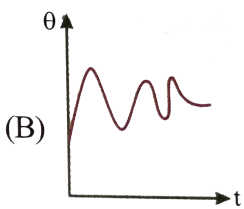
Let the heater was on for t sec, and then it is switched off. Now the temperature of the mixture falls due to heat loss to environment. The temperature of the mixture is measured $t/2\,\mathrm{sec.}$ after switching off. Let the fall in temperature during this time is ε

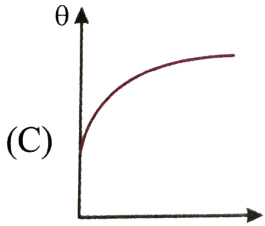
Now the corrected final temperature is taken as

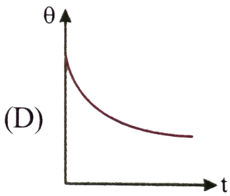
$\theta_f = \theta_f + \varepsilon$

If the system were losing heat according to Newton's cooling law, the temperature of the mixture would change with time according to (while heater was on)

A. 

B. 

C. 

D. 

Answer: C

View Text Solution

Asserson and Reason

1. Assertion (A): Least count of all screw based instruments is same.

Reason (R): Least count for all screw based instruments are found using the ratio of pitch per division of circular scale.

A. Assertion is True, Reason is True, Reason is correct explanation for Assertion.

B. Assertion is True, Reason is True, Reason is not correct explanation for Assertion.

C. Assertion is True , Reason is False.

D. Assertion is False, Reason is True.

Answer: D

Watch Video Solution

2. Assertion (A): Backlash error can be minimised by turning the screw in one direction only when fine adjustment is done.

Reason (R): Backlash error is caused due to wear and tear or loose- fittings in screws.

A. Assertion is True, Reason is True, Reason is correct explanation for Assertion.

B. Assertion is True, Reason is True, Reason is not correct explanation for Assertion.

C. Assertion is True , Reason is False.

D. Assertion is False, Reason is True.

Answer: A

Watch Video Solution

3. Assertion (A) : Screw gauge with a pitch of $0.5mm$ is more accurate then $1mm$ for same number of circular scale divisions.

Reason (R): Higher pitch can make the device more accurate.

A. Assertion is True, Reason is True, Reason is correct explanation for Assertion.

B. Assertion is True, Reason is True, Reason is not correct explanation for Assertion.

C. Assertion is True, Reason is False.

D. Assertion is False, Reason is True.

Answer: C

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4. Assertion (A) : Time period of a hollow ball will be more than that of a solid ball of same radius.

Reason (R) : Time period is independence of mass or distribuiton but on $\sqrt{l}$, where l is the distance between the point of suspension and the centre of the bob.

A. Assertion is True, Reason is True, Reason is correct explanation for Assertion.

B. Assertion is True, Reason is True, Reason is not correct explanation for Assertion.

C. Assertion is True, Reason is False.

D. Assertion is False, Reason is True.

Answer: D

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Subjective type

1. A screw gauge having 100 equal division and a pitch of length $1mm$ is used to measue the diameter of a wire of length $5.6cm$. The main scale reading is $1mm$ and 47^{th} circular division coincides with the scale. Find the curved surface area of wire in cm^2 to appropriate significant fihure.

$\left(use\pi = \frac{22}{7}\right.$

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2. In Searle's experiment, the diameter of the wire as measured by a screw gauge of least count $0.01cm$ is $0.050cm$. The length, measured by a scale of least count $0.1cm$, is $110.0cm$. When a weight of $50N$ is suspended from the wire, the extension is measure to be $0.125cm$ by a micrometer of least count $0.01cm$. Find the maximum error in the measurement of Young's modulus of the material of the wire from these data..

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3. The side of a cube is measured by vernier callipers (10 divisions of a vernier scale coincide with 9 divisions of main scale, where 1 division of main scale is $1mm$). The main scale reads $10mm$ and first division of vernier scale coincides with the main scale. Mass of the cube is $2.736g$. find the density of the cube in appropriate significant figures.

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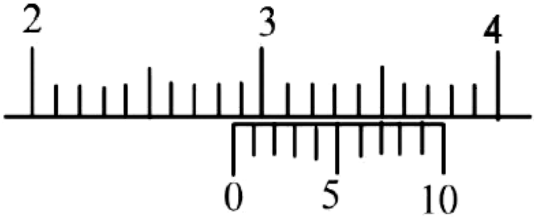
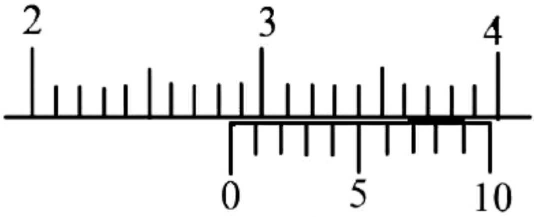
4. There are two Vernier calipers both of which have $1cm$ divided into 10 equal divisions on the main scale. The vernier scale of the calipers (c_1) has 10 equal divisions that correspond to 9 main scale divisions. The Vernier scale of the other calipers (C_2) has 10 equal divisions tgat correspond to 11 main scale divisions. the reading of the two calipers are shown in the figure. the measured values (in cm) by calipers C_1 and C_2 respectively, are

C_1



C_2



A. 2.85 and 2.82

B. 2.87 and 2.83

C. 2.87 and 2.86

D. 2.87 and 2.87

Answer: B

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5. Consider a Vernier callipers in which each $1cm$ on the main scale is divided into 8 equal divisions and a screw gauge 5 divisions of the Vernier scale coincide with 4 divisions on the main scale and in the screw gauge, one complete rotation of the circular scale moves it by two divisions on the linder scale. Then:

A. If the pitch of the screw gauge is twice the least count of the Vernier callipers, the least count of the screw gauge is $0.01mm$

B. If the pitch of the screw gauge is twice the least count of the Vernier callipers, the least count of the screw gauge is $0.005mm$

C. If the least count of the linear scale of the screw gauge is twice the least count of the Vernier callipers, the least count of the screw gauge is $0.01mm$

D. If the least count of the linear scale of the screw gauge is twice the least count of the Vernier callipers, the least count of the screw gauge is $0.005mm$

Answer: B::C

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6. In an experiment of simple pendulum, time period measured was $50s$ for 25 vibrations when the length of the simple pendulum was taken to be $100cm$. If the lest count of stop watch is $0.1s$ and that of metre scale is $0.1cm$, calculate the maximum possible percentage error in the measurement of value of g.

Watch Video Solution

Level-VI(Single answer)

1. In resonance tube experiment , the velocity of sound is given by $v = 2f_0(l_2 - l_1)$. We found $l_1 = 25.0cm$

and $l_2 = 75.0cm$. If there is no error in frequency, what will be the maximum permissible errror in the speed of sound ? (Take $f_0 = 325Hz$)

A. $0.2m / s$

B. $0.65m / s$

C. $1.3m / s$

D. $2.6m / s$

Answer: C

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2. In Searle's exp to find Young's modulus, the diameter of wire is mesured as $D = 0.05 cm$ length of wire is $L = 125 cm$, and when a weight, $m = 20.0 kg$ is put, extension in wire was found to be $0.100 cm$. Find maximum permissible percentage error in Young's modulus (Y)

A. $2.1\,\%$

B. $3.2\,\%$

C. $4.3\,\%$

D. $5.4\,\%$

Answer: C

Watch Video Solution

3. To find the value of g using simple pendulum. $T = 2.00 \sec, \quad 1 = 1.00m$ was measured. Estimate maximum permissible error in g. (use $\pi^2 = 10$)

A. $0.1m/s^2$

B. $0.2m/s^2$

C. $0.3m/s^2$

D. $0.4m/s^2$

Answer: B

Watch Video Solution

4. A student performs an experiment for determination of $g\left[=\frac{4\pi^2 L}{T^2}\right]$, $L \approx 1m$, and he commits an error of ΔL. For T he takes the time of n oscillations with the stop watch of least count ΔT. For which of the following data, the measurement of g will be most accurate ?

A. $\Delta l = 0.5, \Delta t = 0.1, n = 20$

B. $\Delta l = 0.5, \Delta t = 0.1, n = 50$

C. $\Delta l = 0.5, \Delta t = 0.01, n = 20$

D. $\Delta l = 0.1, \Delta t = 0.05, n = 50$

Answer: D

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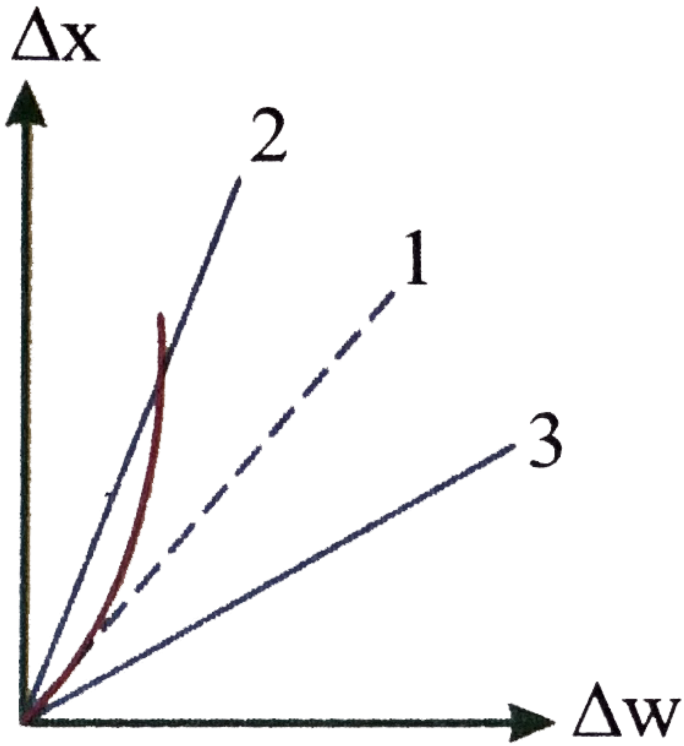
5. In the experiment, the curve between ΔX and ΔW is shown as dotted line (l). If we use an another wire of same material, but with double length and double radius. Which of the curve is expected.



A. 1

B. 2

C. 3

D. 4

Answer: C

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6. If we use very thin and long wire, then

A. Sensitivity $\left(\frac{\text{output}}{\text{input}} = \frac{\Delta X}{\Delta W}\right)$ of experiment increases

B. Young's modulus will remain unchanged

C. Wire may break or yield during loading.

D. All of the above

Answer: D

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7. If accidentally the calorimeter remained open to atmosphere was for some time during the experiment, due to which the steady state temperature comes out to be $30^{\circ}c$, then total heat lost to surrounding during the experiment, is (Use the specific heat capacity of the liquid from previous question).

A. $20kcal$

B. $15kcal$

C. $10kcal$

D. $8kcal$

Answer: B

View Text Solution

8. If a tuning fork of frequency $(340 \pm 1\%)$ is used in the resonance tube method and the first and second resonance lengths are $20.0cm$ and $74.0cm$ respectively. Find the maximum possible percentage error in speed of sound.

A. $5.03m/s$

B. $0.503m/s$

C. $2.51m/s$

D. $0.251m/s$

Answer: A

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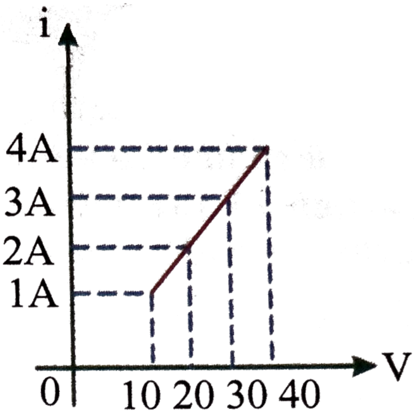
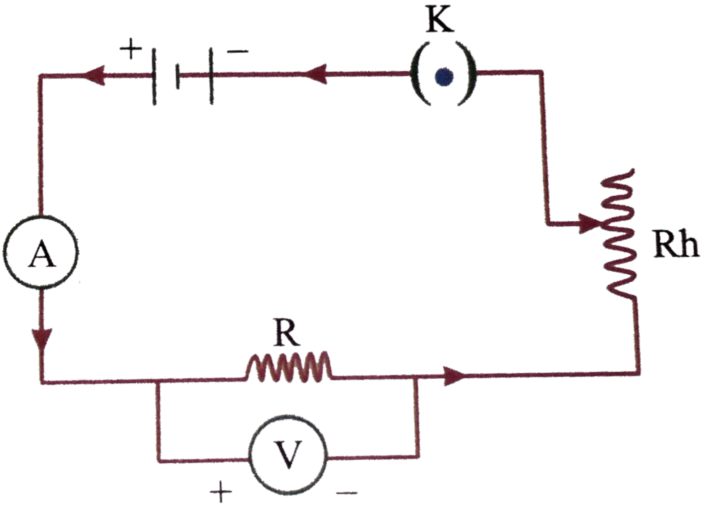
9. If emf of battery is $100V$, then what was the resistance of Rheostat adjusted at reading ($i = 2A$,

$V = 20V)$





A. 10Ω

B. 20Ω

C. 30Ω

D. 40Ω

Answer: D

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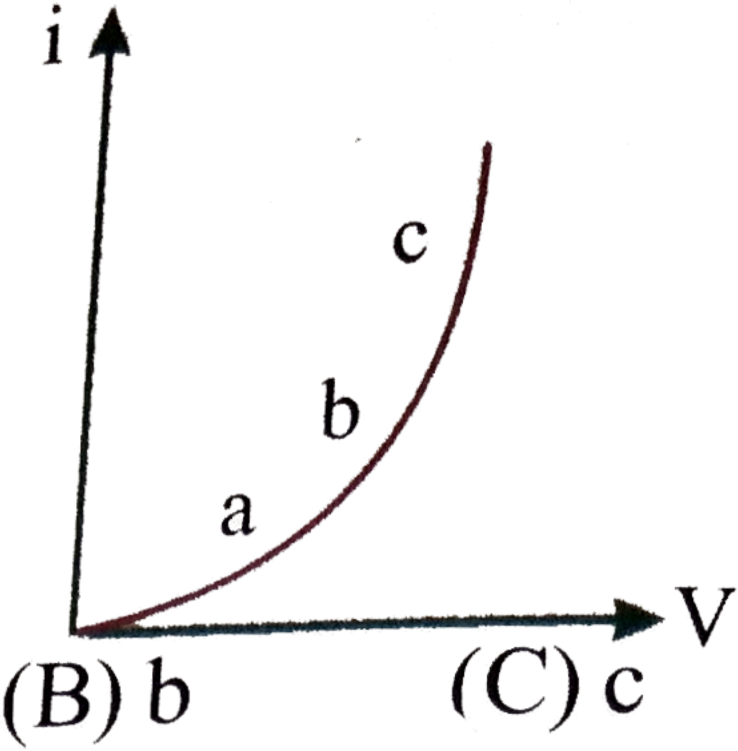
10. Iv/sV curve for a non Ohmic resistance is shown.

The dynamic resistance is maximum at point



A. a

B. b

C. c

D. same for all

Answer: C

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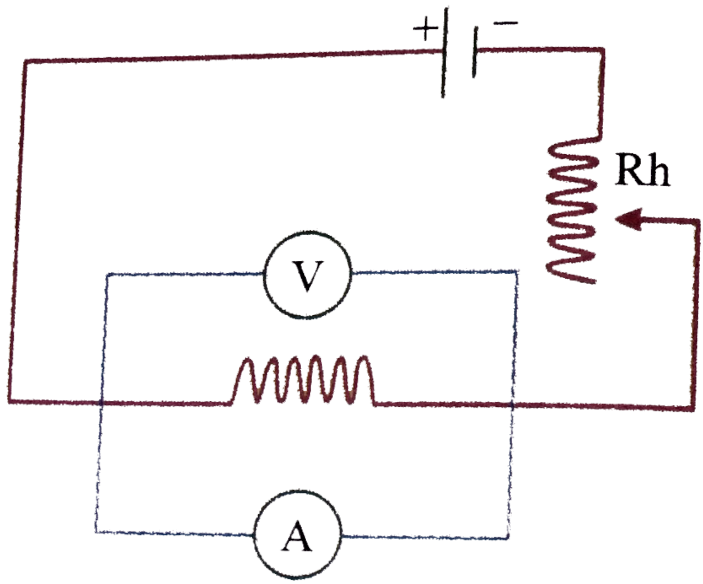
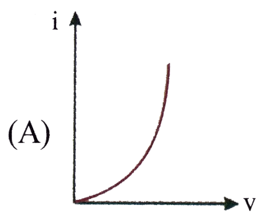
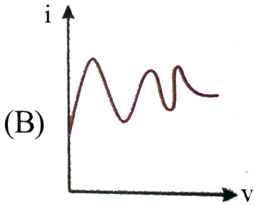
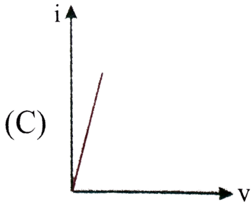
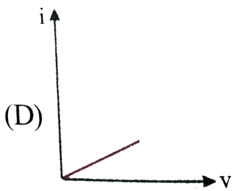
11. If by mistake Ammeter is connected parallel to the resistance then $i - V$ curve expected is (Here i= reading of ammeter, $V =$ reading of voltmeter)



A. 

B. 

C. 

D. 

Answer: C

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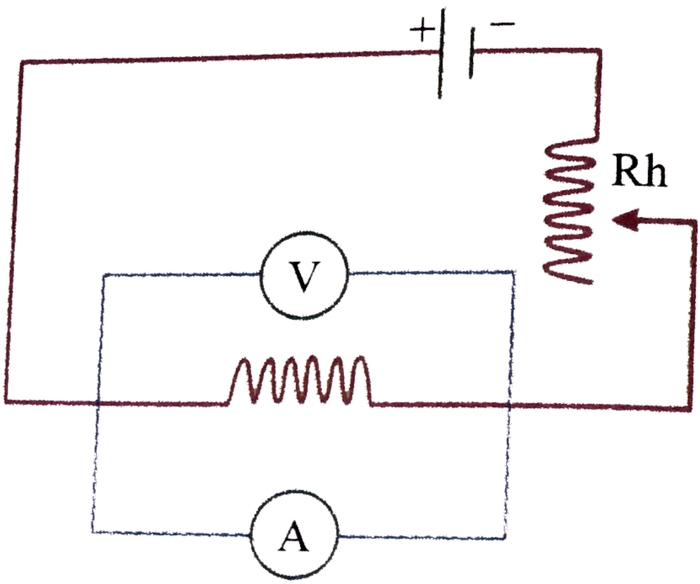
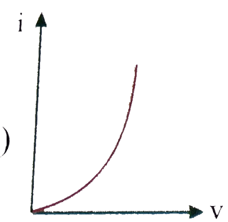
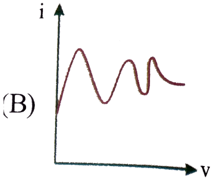
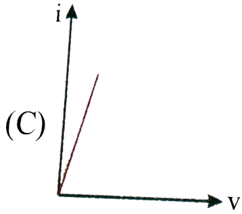
12. If by mistake Ammeter is connected parallel to the resistance then $i - V$ curve expected is (Here i= reading of ammeter, V = reading of voltmeter)

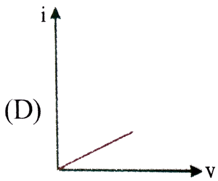


A. (A)



B. 

C. 

D. 

Answer: D

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13. In the experiment of Ohm's law, when potential difference of 10.0 V is applied, current measured is 1.00

A. If length of wire is found to be 10.0cm and diameter of wire 2.50 mm, then find maximum permissible percentage error in resistivity.

A. $1.8\ \%$

B. $10.2\ \%$

C. $3.8\ \%$

D. $5.75\ \%$

Answer: C

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14. From some instruments current measured is $I = 10.0 amp,$ potential different measured is $V = 100.0V$, length of wire is $31.4cm$, and diameter of wire is $2.00mm$ (all in correct significant figure). The resistivity of wire (in correct significant figures)will be (use $\pi = 3.14$)

A. $1.00 \times 10^{-4} \Omega - m$

B. $1.0 \times 10^{-4} \Omega - m$

C. $1 \times 10^{-4} \Omega - m$

D. $1.000 \times 10^{-4} \Omega - m$

Answer: A

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15. In the previous question, maximum permissible error is resitivity and resistance measurement will be

A. 2.14%, 1.5%

B. 1.5%, 2.45%

C. 2.41%, 1.1%

D. 2.45%, 1.5%

Answer: C

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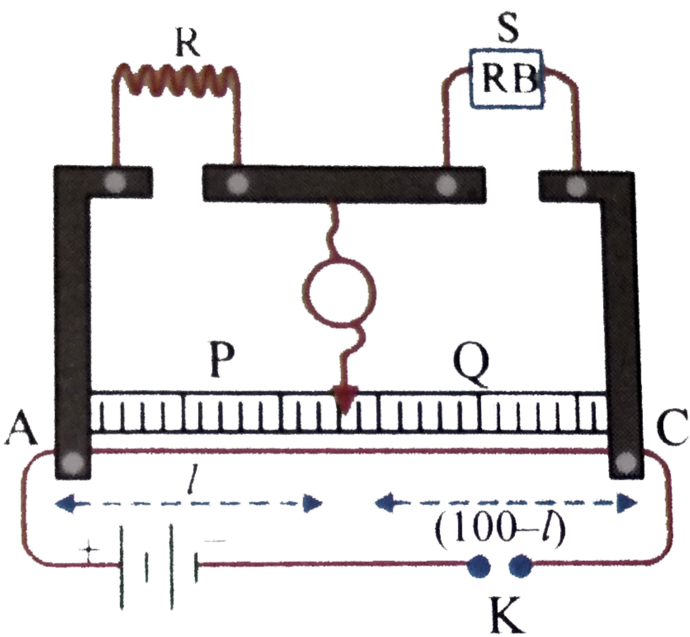
16. If resistance S in $RB = 300\Omega$, then the balanced length is found to be $25.0cm$ from end A. The diameter of unknown wire is $1mm$ and length of the unknown wire is $3.14cm$. The specific resistivity of the wire should be



A. $2.5 \times 10^{-4}\Omega - m$

B. $3.5 \times 10^{-4} \Omega - m$

C. $4.5 \times 10^{-4} \Omega - m$

D. $1.5 \times 10^{-4} \Omega - m$

Answer: A

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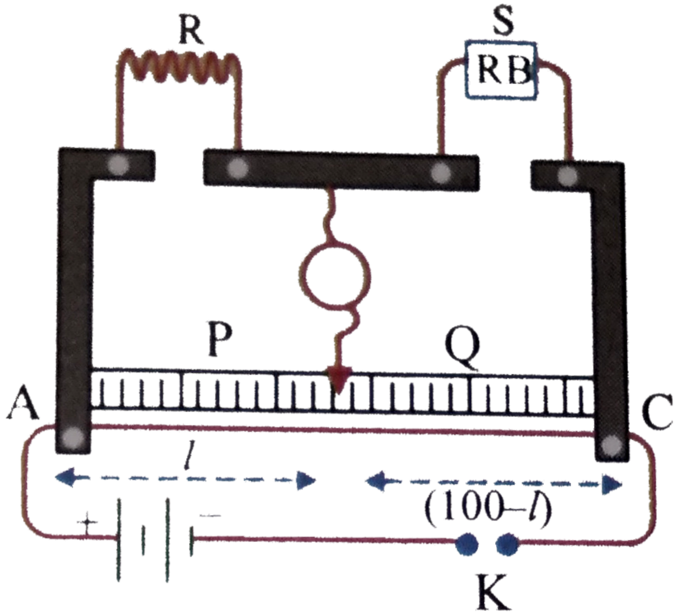
17. In the previous question, if R and S are interchanged, balanced point is shifted by



A. $30cm$

B. $\frac{40}{3}cm$

C. $\frac{100}{3}cm$

D. $20cm$

Answer: C

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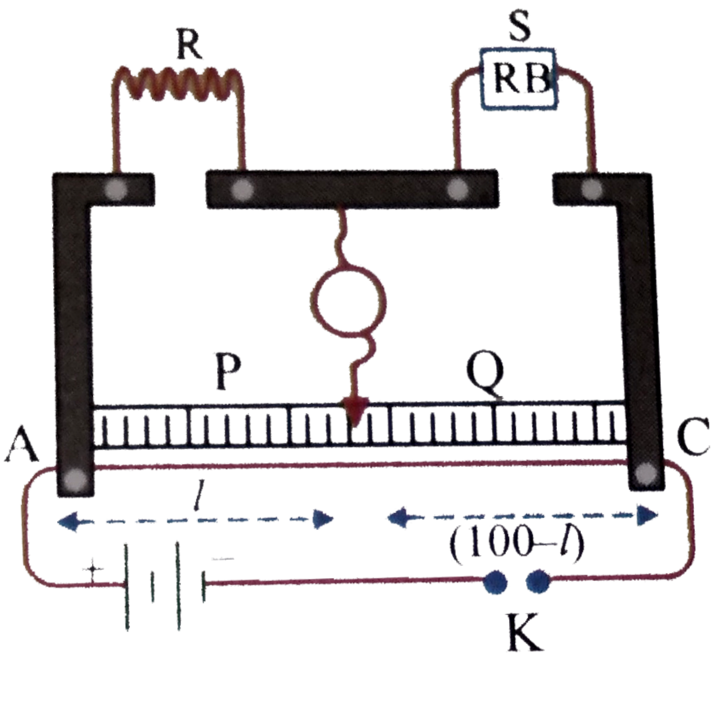
18. In a meter bridge, null point is at $l = 33.7cm$, when the resistance S is shunted by 12Ω resitance the null point is found to be shifted by a distance of $18.2cm$. The value of unknown resistance R should be



A. 13.5Ω

B. 68.8Ω

C. 3.42Ω

D. 1.42Ω

Answer: B

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19. In $u - v$ method to find focal length of a concave mirror, if object distance is found to be $10.0cm$ and image distance was also found to be $10.0cm$, then find maximum permissible error in f.

A. $5 \pm 0.002cm$

B. $5 \pm 0.01 cm$

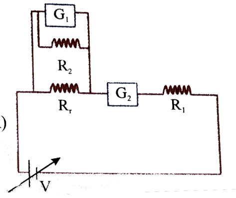
C. $5 \pm 0.02 cm$

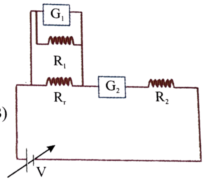
D. $5 \pm 0.05 cm$

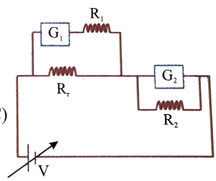
Answer: D

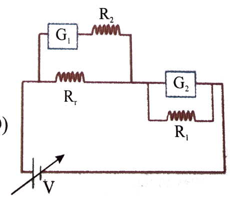
Watch Video Solution

20. To verify Ohm's law, a student is provided with a test resistor R_T, a high resistance R_1 . a small resistance R_2, two identical galvometers G_1 and G_2 and voltage source V. The correct circuit to carry out the experiment is.

A. 

B. 

C. 

D. 

Answer: C

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21. A vernier calipers has $1mm$marks on the main scale. It has 20 equal divisions on the Verier scale which match with 16 main scale divisions. For this Vernier calipers, the least count is

A. $0.02mm$

B. $0.05mm$

C. $0.1mm$

D. $0.2mm$

Answer: D

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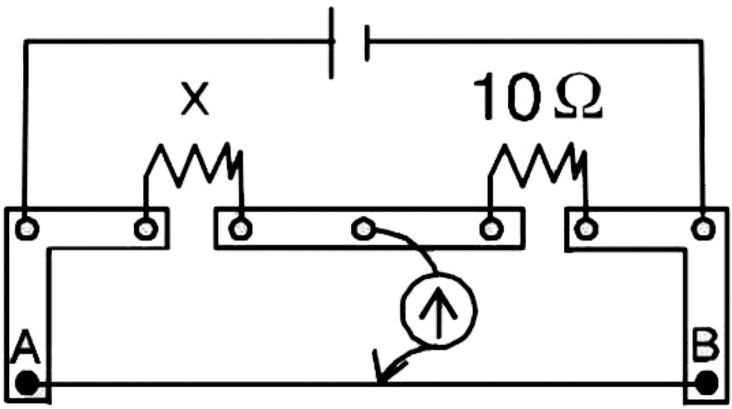
22. A meter bridge is set up as shown, to determine an unknown resistance X using a standard 10 ohm resistor. The galvanometer shows null point when tapping -key is at 52 cm mark. The end-corrections are 1 cm and 2 cm respectively for the ends A and B. The determine value of X is



A. $10.2 ohm$

B. $10.6 ohm$

C. $10.8 ohm$

D. $11.1 ohm$

Answer: B

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23. The density of a solid ball is to be determined in an experiment. The diameter of the ball is measured with a screw gauge, whose pitch is $0.5 mm$ and there are 50 divisions on the circular scale. The reading on the main scale is $2.5 mm$ and that on circular scale is 20 divisions. if the measured mass of the ball has a relative error of 2%, the relative percentage error in the density is

A. 0.9%

B. 2.4%

C. 3.1%

D. 4.2%

Answer: C

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24. In the determination if Young's modulus $\left(\left(Y = \frac{4MLg}{\pi l d^2}\right.\right.$ by using searle's method, a wire of length $L = 2m$ and diameter $d = 0.5mm$ is used. For a load $M = 2.5kg$, an extension $l = 0.25mm$ in the length of the wire is observed. Quantites D and l are measured using a screw gauge and a micrometer, respectively. they have the same pitch of $0.5mm$. the number of divisions on their circular scale is 100. the contrubution to the maximum probable error of the Y measurement

A. due to the errors in the mesurement of d and l are the same

B. due to the error in the measurement of d is twice that due to the error in the meaurement of l

C. due to the error in the measurement of l is twice that due to the error in the measurement of d.

D. due to the error in the measurement of d is four times that due to the error in the measurement of l.

Answer: A

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25. A student is performing the experiment of resonance column. The diameter of the column tube is $4cm$. The frequency of the tuning fork is $512Hz$. The air tempreture is $38 \circ C$ in which the speed of sound is $336 m / s$. The zero of the meter scale coincide with the top end of the resonance column tube. when the first resonance ocuurs, the reading of the water level in the column is

A. $14.0 cm$

B. $15.2 cm$

C. $16.4 cm$

D. $17.6 cm$

Answer: B

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Comprehension type

1. If we use 100Ω and 200Ω in place of R and X we get null point deflection, $l = 33cm$. If we interchange the resistors, the null point length is found to be $67cm$ Find end corrections $\propto$ and β.

A. $\alpha = 1cm, \beta = 1cm$

B. $\alpha = 2cm, \beta = 1cm$

C. $\alpha = 1cm, \beta = 2cm$

D. None of these

Answer: A

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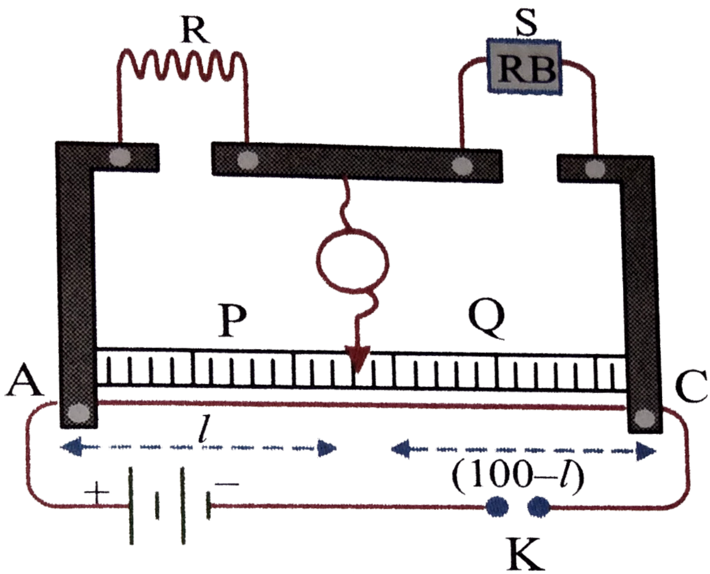
2. Consider the meter bridge circuit without neglecting and corrections (α, β)



Now er start taking obsevation. At the position of R, unknown resistance is used, and at position of S, 300Ω resistance is used. If the balanced length was found to be $l = 26cm$, then estimate the unknown resistance.

A. 108Ω

B. 105.4Ω

C. 100Ω

D. 110Ω

Answer: A

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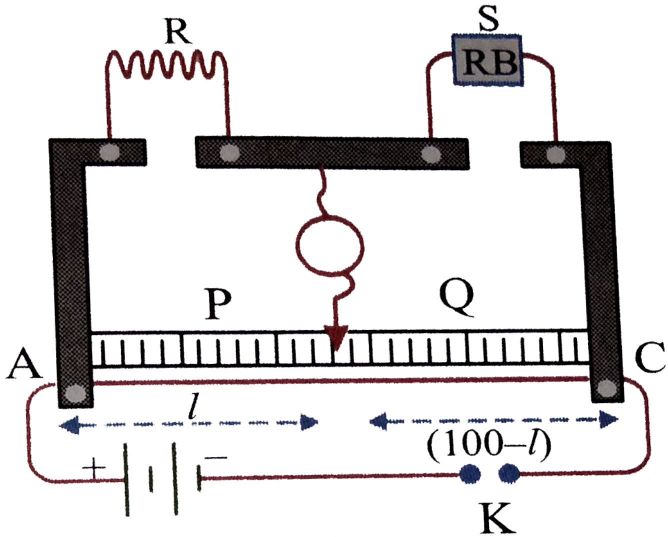
3. Consider the meter bridge circuit without neglecting and corrections (α, β)



If the unknown Resistance calculated without using the end corraction, is R_1 and using the end corrections is R_2 then

A. $R_1 > R_2$ when balanced point is in first half

B. $R_1 < R_2$ when balanced point is in first half

C. $R_1 > R_2$ when balanced point is in second half

D. $R_1 > R_2$ always

Answer: A

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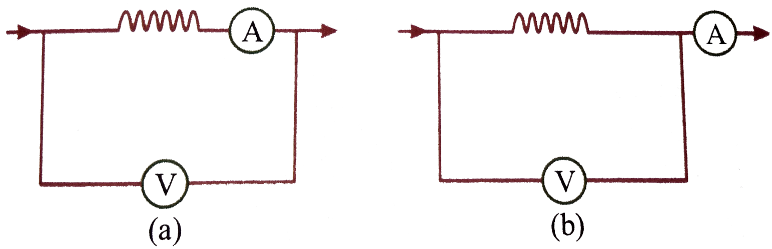
4. In the, Ohm's law experiment to find resistance of unknown resistor R, following two arrangement (a) and (b) are possible.



The resistance measured is given by

$$R_{measured} = \frac{V}{i}$$

V= voltage reading of voltmeter, $i =$ current Reading of ammeter.

But unfortunately the ammeters and voltmeter used are not ideal, but having resistance R_A and R_V respectively.

For arrangement (s), the measured resistance is

A. $R + R_V$

B. $R + R_A$

C. $\frac{RR_V}{R + R_V}$

D. $\frac{RR_V}{R + R_V} + R_A$

Answer: B

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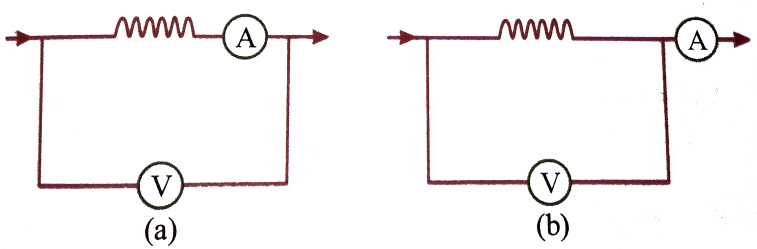
5. In the, Ohm's law experiment to find resistance of unknown resistor R, following two arrangement (a) and (b) are possible.



The resistance measured is given by

$$R_{measured} = \frac{V}{i}$$

V= voltage reading of voltmeter, $i =$ current Reading of ammeter.

But unfortunately the ammeters and voltmeter used are not ideal, but having resistance R_A and R_V respectively.

For arrangement (b), the measured resistance is

A. $R+R_V$

B. $R+R_A$

C. $\dfrac{RR_V}{R+R_V}$

D. $\dfrac{RR_V}{R+R_V}+R_A$

Answer: C

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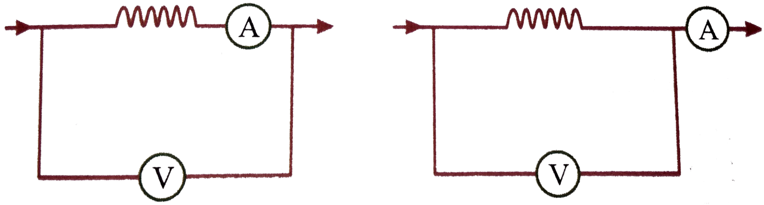
6. In the, Ohm's law experiment to find resistance of unknown resistor R, following two arrangement (a) and (b) are possible.



(a) (b)

The resistance measured is given by

$$R_{measured} = \frac{V}{i}$$

V= voltage reading of voltmeter, $i =$ current Reading of ammeter.

But unfortunately the ammeters and voltmeter used are not ideal, but having resistance R_A and R_V respectively.

You are given two resistor X and Y. Whose resistance is to be determined , using an ammeter of $R_A = 0.5\Omega$ and a voltmeter of $R_V = 20K\Omega$. It is known that X is in range of a few Ohm and Y is in range of several kilo ohm. Which of the circuit is preferable to measure X and Y-Resistor Circute

A. $x \rightarrow (a), y \rightarrow (b)$

B. $x \rightarrow (b), y \rightarrow (a)$

C. $x \rightarrow (a), y \rightarrow (a)$

D. $x \rightarrow (b), y \rightarrow (b)$

Answer: B

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