The Brigade School Unit Test 1 (2020-21)

Total points 14.5/25

Class 10 Subject: Physics Paper: 2 Marks: 25

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Class: *

10 A

School: *

TBSG

Physics Subjective Questions Paper 2

6 of 8 points

All Questions in this section are for 2 marks

✓ 1. Why do we use a long handle with a screw jack? * 2/2

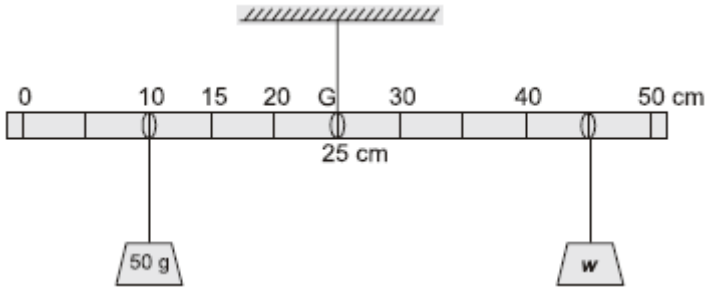
A long handle is used for screw jack because longer is the arm (perpendicular distance) less effort has to be applied.
The turning effect of the body depends on the the force and perpendicular distance of line of action, thus, to apply less force the distance must be more (length). This is the reason why a long handle is used in a jack screw.

Q10 - Objective Type - Last Option - 20 kHz and above.

Feedback

In a screw jack, a long handle helps us to apply less force F at a farther distance from the axis of rotation. Thus making ⊥ d large so as to give a large turning effect.
(1+1)

✗ 2. A half metre ruler is suspended by a thread from the mid-point of the ruler as shown in the figure. It balances horizontally when a 50 g and an unknown weight w are suspended respectively from 10 cm and the 45 cm mark. Calculate the magnitude of weight w. * 0/2



According to the principle of equilibrium,

Sum of anticlockwise moment = Sum of clockwise moment
10 x 50 = 45 x w
500 = 45w
w=100/9
w=11.11

Therefore, the magnitude of w is = 11.11

Feedback

: Since the ruler is in equilibrium
According to the principle of moment,
Clockwise moment = Anticlockwise moment
w × 20 cm = 50 g f × 15 cm
w= (50 x 15)/20 = 37.5 g
(1+1)

✓ 3. A body of mass 5 kg is moving with a velocity of 10 m s−1. What will be the ratio of its initial kinetic energy and final kinetic energy, if the mass of the body is doubled and its velocity is halved? * 2/2

Initial KE = (1/2)mv^2
= (1/2) x 5 x 10 x 10
= 250 J

Final KE = (1/2)mv^2
= (1/2) x 10 x 5 x 5
= 125 J

Ratio = Initial KE/Final KE
= 250 / 125
= 2/1
= 2:1

Thus, the ratio of its initial kinetic energy and final kinetic energy, if the mass of the body is doubled and its velocity is halved will be 2:1.

Feedback

Given: m1 = 5 kg, v1 = 10 m s−1, m2 = 10 kg, v2 = 5 m s−1
KE1/KE2 = 1/2 m1v1^2/ 1/2 m2v2^2 = 1/2 x 5 x 10 x 10 / 1/2 x 10 x 5 x5 = 250/ 125 = 2:1
(1/2 +1/2 +1)

✓ 4. (i) State the relation between mechanical advantage, velocity ratio and efficiency of a machine. (ii) Explain the MA of a lever based on the class to which it belongs. * 2/2

(i) Mechanical Advantage (M.A.) = Velocity Ratio (V.R.) x Efficiency (η)
(ii) The MA of the class 1 lever can be greater than 1, lower than 1 or equal to 1.
The MA of class 2 lever is always greater than 1 and thus this class lever acts as a force multiplier.
The MA of class 3 lever is always lesser than 1 and thus this class lever acts as a speed multiplier.

Feedback

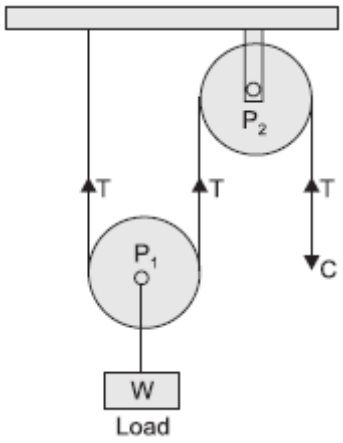
(i) MA/VR = efficiency
(ii) Class 1 lever (F between L and E) MA <,> or = to 1; Class 2 lever (L between F and E) MA always > 1; Class 3 lever (E between L and F) MA always <1
(1/2 x 4)

Physics Subjective Questions Paper 2

5.5 of 9 points

All Questions in this section are for 3 marks

✓ 5. The given figure shows the combination of a movable pulley P1 with a fixed pulley P2 used for lifting up a load w. (a) State the function of the fixed pulley P2. (b) If the free end of the string moves through a distance x, find and explain the distance by which the load w is raised. (c) Calculate the force to be applied at C to just raise the load w = 20 kgf, neglecting the weight of the pulley P1 and friction. * 3/3



(a) The fixed pulley helps to change the direction of application of force, that is, if the pulley P2 is not present, the effort would bee needed upwards but due to the presence of pulley P2, the effort is applied downwards which is more convenient.
(b) If the free end of the string moves through a distance x, the distance by which the load w is raised is x/2.
(c) E = w/2
= 20/2
= 10 kgf

Feedback

a) Fixed pulley P2 is used to change the direction of effort to a convenient direction.
(b) As the free end of the string moves through a distance x, there being two segments of the thread carrying the movable pulley, the load w is raised up by x/2 distance; because each segment of thread shortens by a distance x/2
(c) In equilibrium, L = T + T = 2T
Force applied at C = Effort (E) = T
L/E = 2T/T =T; 20/E =2 so E = 10 kgf
(1+1+ 1)

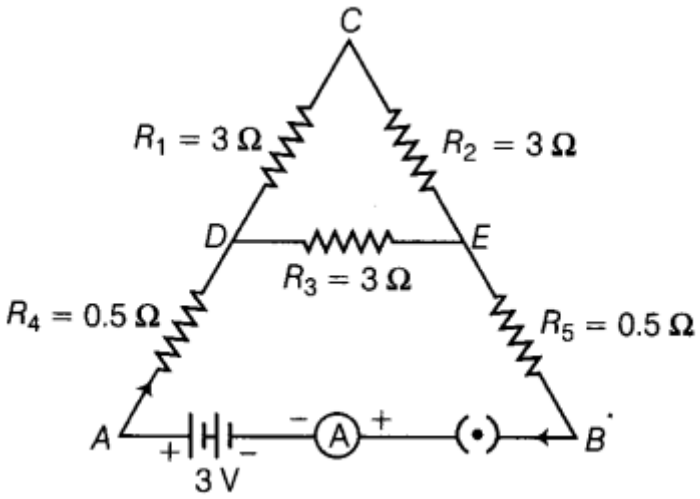
✗ 6. (i) State the condition for resonance to occur. (ii) Why is a loud sound heard at resonance? (iii) State one difference between resonant vibration and forced vibration. * 2.5/3

(i) Resonance occurs only when the applied force causes forced vibrations in the body and the frequency of the applied force is exactly equal to the natural frequency of the body .
(ii) A loud sound is heard at resonance because the amplitude increase as both the bodies start vibrating louder.
(iii) The amplitude of forced vibration is small but its larger is resonance compared to the forced vibration.

Feedback

(i) Resonance occurs when the frequency of applied force is exactly equal to the natural frequency of the vibrating body.
(ii) At resonance, the body vibrates with a large amplitude and conveys more energy to the ears so a loud sound is heard..
(iii) Any one difference from page 161 of the text book
(1+1+1)

✗ 7. Five resistors are connected in a circuit as shown in the diagram. Find the ammeter reading when circuit is closed. * 0/3



1/Rp = 1/R1 + 1/R2 + 1/R3
1/Rp = 1/3 + 1/3 + 1/3
1/Rp = 3/3
1/Rp = 1
Rp = 1 ohm

Total R = Rp + R4 + R5
R = 1 + 0.5 + 0.5 + 1
R = 2 ohm

V = 3V

V=IR
3=I x 2
I = 1.5 A

Thus the current is 1.5 ampere.

Feedback

R1 and R2 are in series so Rs = 3 + 3 =6 ohms
Rs and R3 are in parallel so 1/Rp = 1/Rs+ 1/R3; 1/Rp = 1/6 +1/3 ; Rp = 2 ohms
R4, Rp, R5 are in series so Req = 0.5+2+0.5 = 3 ohms
V= IR; I = V/R = 3/3 = 1 Ampere
(1/2 + 1/2 +1 + 1)

Physics Subjective Questions Paper 2 3 of 8 points

All Questions in this section are for 4 marks

✕ 8. (a) A man standing between two cliffs produces a sound and hears two successive echoes at intervals of 3 s and 4 s respectively. Calculate the distance between the two cliffs. The speed of sound in the air is 330 m s−1. (b) Why will an echo not be heard when the distance between the source of sound and the reflecting surface is 10 m? * 1.5/4

(a) V = 2d/t
330 = 2d/3
d=495 m
(b)The echo will not be heard because the minimum distance between the source of sound(or observer) and the the reflector in air must be 17m.

Feedback

Distance of the man from nearer cliff, 2d = v x t; d = (330 x 3) /2 = 495 m
Distance of the man from another cliff, 2d = v x t; d = (330 x 4) /2 = 660 m

Total distance between two cliffs
d = d1 + d2 = 495 + 660 = 1155 m
(1/2 + 1/2 + 1)
(ii) The sensation of any sound persists in our ear for about 0.1 s after the sound heard dies off. If the echo is heard within this time interval, the original sound and the echo cannot be distinguished. So, to hear the echo distinctly, 2d = v x t; taking speed of light to be 340 m/s d = (340 x 0.1)/ 2 = 34/2 =7 . Hence the minimum distance of the obstacle from the observer should be 17 m.
(1/2 + 1/2 + 1)

✗ 9. (a) An electrical appliance is rated as '120 W- 220 V' What information does this convey. (b) State the formula that calculates the heat produced in a wire when current is passed through it. (state what the symbols you have used stand for) (c) A household five 60 W bulbs for 5 hours daily, two 100 W fans for 5 hours daily. Calculate the electricity bill for the month of November at Rs. 3 per unit. * 1.5/4

(b) Heat = I^Rt joules where I stands for current, R for resistance and t for time taken.
(a) The information tells us the power rating of the electrical appliance. It tells us that the appliance has a voltage of 220V and and uses a power of 120W.
(c) Energy used by bulb = Power x time
= 60 x 5 / 1000
= 0.3 kWh
Energy used by fans = Power x time
= 100 x 5 / 1000
= 0.5 kWh
Total energy= 0.3 + 0.5 = 0.8 kWh x 30 = 24kWh = 24 units

Cost = 24 x 3 = Rs. 72

Therefore, the cost is Rs. 72.00

Feedback

(a) The information conveyed is - If the electrical appliance is connected to a 220 V supply it will consume 120 J of energy per second. (1)
(b) H= I^2Rt where H= heat, I is the current, R is the resistance of the wire and t the time for which the current is passing through it. (1)
(c) Electric energy consumed by the bulb = 5 x 60 x 5 = 1500 Wh = 1.5 kWh (1/2)
Electric energy consumed by the fan = 2 x 100 x 5 = 1000 wh = 1 kWh (1/2)
Total energy in November = (1.5+1) x 30 (1/2)
Total cost at Rs 3 per unit = 2.5 x 30 x 3= Rs 225 (1/2)