CONCEPTAL QUESTIONS

1. NATURE OF PHYSICAL WORLD AND MEASUREMENTS

1. Why it is convenient to express the distance of stars in terms of light year (or) parsec rather than Km?

As the distance of the star are extra-ordinary large , so it is convenient to express than light year and parsec rather than in Km.

2. Show that a screw gauge of pitch 1mm and 100 divisions is more precise than a vernier caliper with 20 division on the sliding scale?

Precision depends on least count of the instrument. Smaller the least count more precise the instrument. Since least count of screw gauge (0.001cm) is less than the least count of the vernier caliper(0.01cm).It is proved.

3. If humans were to settle on other planets which of the fundamental quantities will be in trouble?why?

Time is not running at the same rate everywhere Einstein's theory show that time given by a clock depends on the clock relative speed with respect to an observer. As a result there is an gravity time dilation.

4. Having all units in atomic standards is more useful. Explain?

It became necessary to redefine units in atomic standard because the prototype offered the following difficulties.

(i) It is difficult to preserve the prototype. (ii) It is difficult to reproduce replica. (iii) The techniques used are not of high accuracy.

5. Why dimensional method are applicable only up to three quantities?

Because on equating the power of M,L,T on either side of the dimensional quantities. We can obtain 3 equations from which only 3 unknown dimensions can be calculated.

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3. LAW OF MOTION

1. Why it is not possible to push a car from inside?

Push on the car by the person and force excerted by the car on the person are through equal and opposite they are internal forces An object cannot move under the influence of internal force.

2. There is a limit beyond which is the polishing of a surface increase frictional resistance rather than decreasing why?

When surfaces are highly polished area of contact between them increases. As a result of large number of atoms and molecules lying on both the surfaces. There is a strong force of attraction on each other. Therefore frictional force increases.

3. Can a single isolated force exist in nature? Explain in your answer?

No, According to Newton's III law forces always exit in pairs.

4. Why does parachute descend slowly?

Because it attains terminal velocity, weight of the parachute and its content and is balanced by viscous drag and force of buoyancy.

5. The momentum of a system of particles is always conserved? True(or)False?

True, When the system is isolated and no external force acts on it.

6. When walking on ice 0ne should take short steps. Why?

When we take big steps the angle of our leg with vertical increases. Hence normal reaction component increases which promotes slipping. So it is advisible to take small step to avoid slipping.

7. When a person walks on surface on the person is opposite to the direction of motion. True or false?

False. Because when the person walk he pushes the ground in the backward direction with his foot and force of friction acts in the forward direction. (ie) In the direction in which man walks.

8. Can the coefficient of friction be more than one?

Yes, The coefficient of friction is less than one for normal surfaces. When surfaces are irregular, they have cavities and minute projection on them. So, coefficient of friction may exceeded unity.

9. Can we predict the direction of motion of a body from the direction of force on it?

It is possible to predict the direction of motion with the help of resultant force of various forces acting on the body.

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4. WORK, ENERGY AND POWER

1. Can a body have energy without Momemntum?

Yes, there is an internal energy in a body due to the thermal agitation of the particles of the body while the vector sum of the momenta of the moving particles may be zero.

2. When is the exchange of energy maximum during an elastic collision?

Energy exchange will be maximum if the two colliding bodies are of equal masses.

3. Is whole of the kinetic energy lost in any perfectly inelastic collision?

No only that much amount of kinetic energy is lost as if necessary for the conservation of momentum.

4. A spark is produced when two stones are struck against each other. why?

The workdone in striking the two stones against each other gets converted into heat. This appears as a spark.

5. Why a metal ball rebounds better than a rubber ball?

When a rubber ball hits a massive object say earth the ball is destroyed. A large amount of heat is generated in the ball by the rubbing of the rubber molecules against each other. This effect is essentially absent in a hard material. So a metal ball often loss less energy up on collision than would a rubber ball.

6. If energy is neither created nor destroyed what happens to the so much energy spent against friction?

The energy is dissipated in the form of heat. The heat energy so produced is not available for work.

7. The Earth moving around the sun in a circular orbit is acted upon by a force and hence work must be done on the earth . Do you agree this statement?

The statement is wrong. The Earth revolve around the sun under the force attraction of the sun. This force (centripetal) is always perpendicular to the motion of the Earth. Therefore $\theta=90^0$ and $W= FSCOS90^0 = 0$.Hence, sun does to work on the Earth

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5. MOTION OF A SYSTEM OF PARTICLES AND BODIES

1. When a tree is cut, the cut is made on the side facing the direction in which the tree is required to fall ? why?

Because the side on which the cut is made is no longer supported by the normal force from the bottom threrefore torque acts on the tree such that it falls on the side as anticipated.

2. Why does a porter bend forward while carrying a sack of rice on his back?

When a porter carries a sack of rice CG shifts from the body line of gravity. However once the porter bends, the CG realigns with with body‘s line of gravity and making the porter balanced.

3. Why is it much easier to balance a meter scale on your finger tip than balancing on a match stick?

A metre scale CG is much above its base, On the other hand. The match stick has its CG much lower as compare to a measure scale higher the CG easier it is to balance.

4. Two identical water bottles one empty and the other filled with water are allowed to roll down an inclined plane. Which one of them reaches the bottom first? Explain your answer?

Water filled bottled reaches the bottom first than the empty bottle. Because water filled bottle are much more massive than the empty bottle, so reaches the bottom quickly.

5. Give an example to show that the following statement is false’ any two forces acting on a body can be combined into single force that would have same effect’?

Consider force to the left on the top of a wheel and an equal force to the right on the bottom of a wheel. The resultant force by vector addition is zero. But the effect on the plate is not zero.

6.GRAVITATION

1. If a comet suddenly hits the moon and impacts energy which the more than the total energy of the moon, what will happen?

If a comet hits the moon with large mass and velocity may destroy the moon completely or its impact makes the moon go out of the orbit.

2. If the Earths pull on the moon suddenly disappears what will happen?

If the gravitational force suddenly disappears moon will stop revolving around the earth it will move in a direction tangential to its original orbit with a speed which it was revolving around the Earth.

3. Book back Q.no 7.

No, The reasons in the Earth arise due to the rotation of Earth around the sun with 23.5^{0} tilt. Due to this 23.5^{0} tilt, when the northern part of Earth is further to the sun, the southern part is nearer to the sun. So when it is summer in northern hemisphere, the southern hemisphere experience winter.

4. Book back Q.no 8.

No. The moon goes around the earth in an elliptical orbit. This means its distance from us varies periodically as it goes around us.

5. What is the effect of rotation of the earth on the acceleration due to gravity?

The acceleration due to gravity decreases due to rotation of the earth. This effect is zero at pole and maximum at the equator.

7.PROPERTIES OF MATTER

1. Why coffee runs up into a sugar lump (a small cube of sugar). When one corner of the sugar lump is held in the liquid?

(i) If sugar cube is dropped into liquid the outermost layer has to dissolve first, then next layer, then next until the whole tring is dissolved. (ii) Trings like chemical reasons or changes of state like dissolution take place on the surface of a solid cube has a lesser surface area and thus the process is slower.

2. We can cut vegetables easily with a sharp knife as compared to a blunt knife? Why?

(i) The area of a sharp edge is much less than the area of a blunt edge for same total force the effective force per unit area is more for the sharp edge than the bleent one. Hence a sharp knife cuts easily than a blunt knife.

3. Why two holes are made to empty an oil tin ?

When one comes out through a tin with one hole the pressure inside the tin becomes less than the atmospheric press soon the oil stops flowing out when two holes are made in the tin area keeps on entering the tin through the other hole and maintains pressure inside.

4. Why the passengers are advised to remove the ink from their pens while going up in aeroplane?

The atmospheric pressure decreases with height, since ink inside the pen is filling at the atmosphere pressure existing on the surface of the Earth. It tends to come out to equalize the Pressure. This can spoil the clones of the passengers. So, they are advised to remove the ink from the pen.

5. We use Straw to suck soft drinks, why?

Due to difference in pressure, between straw and atmosphere soft drink raises in the straw.

6. What is the nature of intermolecular forces?

The intermolecular forces are attractive, but they are repulsive for intermolecular reparation less than

10^{-10} m.

7. What is a perfectly elastic body? Give a example?

If one removal of deforming force a body completely regains its original configuration then it is said to be perfectly elastic. Example: Quartic.

8. It is possible to double the length of a metallic wire by apply in a force over it?

No, it is not possible because with in elastic limit strain is only of the order of 10^{-3} wires actually break much before it is stretched to double the length.

11.WAVES (BOOK BACK QUESTION)

1. Answer: Transverse Waves travel in the form of crests and troughs and so involve change in shape. As gas has no elasticity of shape, hence transverse waves cannot be produced in a gas. Transverse waves can be produced in solids and on the surface of liquids.

2. Answer: Roaring of a national animal and produces a sound of low pitch and high intensity or loudness. Whereas the buzzing of mosquito produces a sound of high pitch and low intensity or loudness

3. Answer: yes. Does not matter whether be sound source or be Transmission media are in motion

4. Answer: sound is a form of energy. The furniture which act as obstacles absorbs most of energy. So the intensity of sound become low but in empty room, due to the absence of obstacles the intensity of sound remain mostly same but we feel it louder.

5. Answer: Some animals are belived to be sensitive to be low frequency sound waves emitted by hurricanes. They can also detect the single drops in air and water pressure that signal Strom's approach.

6. Answer: The frequency of the note produced by an air coloumn inversely proportional to its length. As the level of water in the vessel rises the length of the air coloumn about it decreases. It produces sound of decreasing frequency. The sound becomes shorter. From the shrillness of sound, it is possible to realize whether the vessel is filled water.

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MOTIVATIONAL THOUGHTS

LEARNING GIVES CREATIVITY,

CREATIVITY LEADS THINKING

THINKING PROVIDES KNOWLEDGE

KNOWLEDGE MAKES YOU GREAT…

--DR.A.P.J. ABDULKALM

PREPARED BY

E.DEVADINESH M.SC, B.ED, CLP.

PG ASSISTANT IN PHYSICS

GREENPARK MATRIC HR.SEC.SCHOOL

SIRVACHUR (PO) PERAMBALUR (DT)

CELL: 9524220942

EMAIL: devadineshphy93@gmail.com