

**BARNES SCHOOL & JUNIOR COLLEGE, DEVLALI**

**HALF-YEARLY EXAMINATION 2011-2012**

**PHYSICS**

Time : 1<sup>1/2</sup> Hrs

Class : X

Max Marks : 80

**General Instructions**

*Answers to this paper must be written on the paper provided separately.*

*You will NOT be allowed to write during the first 15 minutes.*

*This time is to be spent in reading the question paper.*

*The time given at the head of this paper is time allowed for writing the answers.*

*This question paper is divided into two sections.*

*Attempt all questions from Section I. and any four questions from Section II.*

*The intended marks for questions or parts of questions are given in brackets ( ).*

*All working, including rough work, must be clearly shown and should be done on the same sheet as the rest of the answer. Omission of essential working will result in loss of marks. Mathematical tables are provided.*

**SECTION - I**

*(Attempt all questions from Section I)*

- Q.1. (a) State one Factor on which the magnitude of a non contact force depends. How does it depend on the factor stated by you ? [2]
- (b) Draw graphs showing the relationship between ; [2]
- (i) Acceleration and force for a constant mass. [2]
- (ii) Acceleration and mass for a constant force.
- (c) (i) On what factor does the position of centre of gravity of a body depend. [2]
- (ii) State centre of gravity of a parallelogram.
- (d) Differentiate between centripetal and centrifugal force. [2]
- (e) The moment of a force of 5N about a point "P" is 2Nm. Calculate the distance of point of application of force from the point P. [2]
- Q.2. (a) Express the relationship between S.I and C.G.S. unit of work. [2]
- (b) What should be the angle between the force and displacement to get [2]
- (i) Zero work (ii) maximum work ?
- (c) Name the physical quantity which is measured in calorie. How it related to the S.I. unit of that quantity ? [2]
- (d) State the energy changes that occur in : [2]
- (i) Petrol engine of running car.
- (ii) A photoelectric cell.
- (e) A cannon ball of mass 500g is fired with a speed of 15m/s. Find its kinetic energy. [2]
- Q.3. (a) Class III levers have mechanical advantage less than 1. Why are they then used ? [2]
- (b) Name the quantity which changes for a given machine & the quantity which remains same. [2]
- (c) State two ways by which the efficiency of pulleys in a block and tackle system can be increased. [2]
- (d) State the condition when a gear system is used to increase the turning effect and when it is used to increase the speed. [2]
- (e) A block and tackle system has 5 pulleys. If an effort of 1000N is needed in the downward direction to raise a load of 4500N. Calculate (i) M.A. (ii) efficiency of system. [2]

(2)

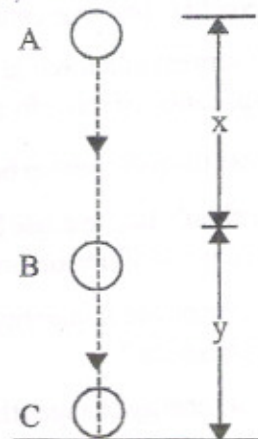
- Q.4. (a) State the condition for no change in direction of light ray on bending. [2]
- (b) How does the angle of deviation produced by a prism change with (i) angle of prism (ii) wavelength of light? [2]
- (c) State the conditions for total internal reflection. [2]
- (d) Draw a diagram to show the deviation of ray of light through  $180^\circ$  in  $45^\circ - 90^\circ - 45^\circ$  prism. [2]
- (e) A man standing 48m away from a wall fires a gun. Calculate the time after which echo can be heard. (Speed of sound in air = 340m/s) [2]

## SECTION -II

(Attempt Any four questions from this section)

- Q.5. (a) State three factors that affect loudness and how do the factors stated by you affect it. [3]
- (b) (i) Sometimes when a vehicle is driven at a particular speed a rattling sound is heard. Explain.  
(ii) State the condition for the occurrence of resonance. [3]
- (c) A pulley system with a velocity ratio of 4 is used to lift a load of 150kgF through a vertical height of 20m. The effort required is 50kgF in the downward direction.  
Calculate (i) distance moved by the effort.  
(ii) work done by the effort.  
(iii) mechanical advantage  
(iv) total number of pulleys & of the number of Pulleys in each block. ( $g=10\text{N/kg}$ ) [4]

- Q.6. (a) An object of mass "m" is allowed to fall freely from point "A" as shown in Figure. Calculate the total mechanical energy on the object at (i) Point A (ii) Point B & (iii) Point C. [6]



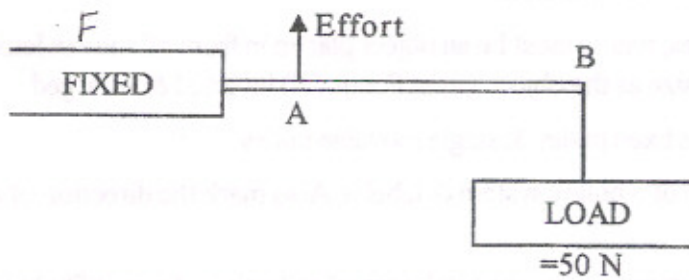
- (b) A ray of monochromatic light is incident from air on glass slab : (i) Draw a labelled ray diagram showing the change in path of ray till it emerges from the glass slab (ii) Name two rays that are parallel to each other. (iii) Mark the lateral displacement in your diagram. [4]
- Q.7. (a) An erect, magnified and virtual image is formed, when an object is placed between the optical centre and principal focus of a lens.  
(i) Name the Lens.  
(ii) Draw a diagram to show the formation of image with the above stated characteristics. [3]

(3)

(b) State and prove work energy Theorem.

[4]

(c) The diagram below shows the use of a lever.



(i) State the principle of moments as applied to the above Lever.

(ii) Give an example of this class of Lever.

(iii) If  $FA = 10\text{cm}$ ,  $AB = 500\text{cm}$ , Calculate the M.A. and the minimum effort required to lift the load .

[3]

Q.8.(a)(i) State the S.I and C.G.S. unit of moment of force.

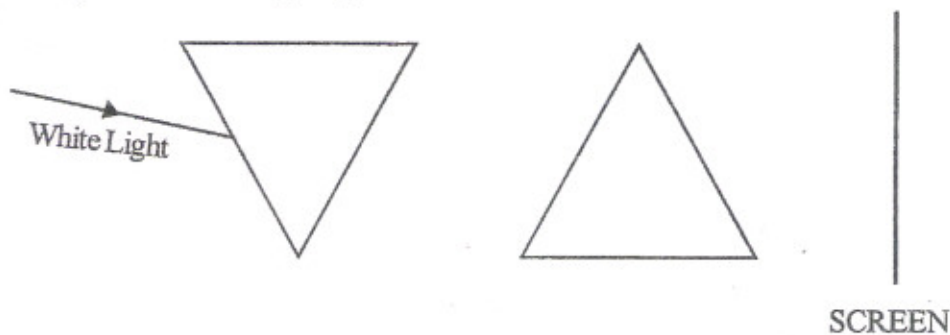
(ii) Write the relationship between them.

(iii) Write the relationship between S.I. & M.K.S. unit of force.

[3]

(b) Complete the following diagram :

[3]

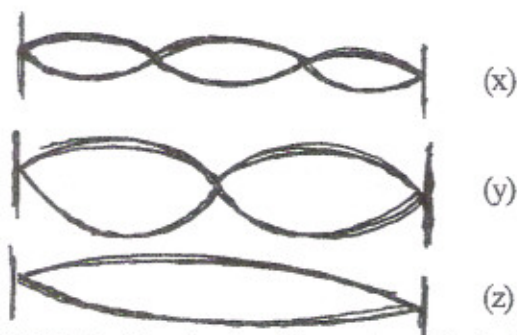


(c) A truck weighing  $1000\text{kgF}$  changes its speed from  $36\text{km/hr}$  to  $72\text{km/hr}$  in 2 minutes. Calculate :

(i) the work done by the engine (ii) Power ( $g = 10\text{m/s}^2$ )

[4]

Q.9.(a) The following figure shows different modes of Vibration of a string :



(i) Which vibration is of largest amplitude ?

(ii) Which of the vibration is the principal note ?

(iii) What is the ratio of frequency between "x" & "z"

[3]

(4)

- (b) (i) How will you detect infrared radiations ?  
(ii) How will you detect ultraviolet radiations ? [4]
- (c) In each of the following cases, where must be an object placed in front of convex lens **SO** that the image formed is (i) of same size as the object. (ii) at Focus (iii) inverted & enlarged. [3]
- Q.10.(a) Differentiate between single fixed pulley & single movable pulley. [3]
- (b) Draw block & tackle system of 5 pulley system & label it. Also mark the direction of tension in each stand. [4]
- (c) Draw a neat labelled ray diagram to show the total internal reflection of a ray of light incident one face of a  $30^\circ$ - $90^\circ$ - $60^\circ$  prism. [3]

