R. I. S. B.
SECOND ASSESSMENT EXAMINATION 2019-20

STD. : X – b
SUB. : PHYSICS **MARKS: 80**
TIME: HRS.

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 paper is the time allotted for writing the answers.*
- *Attempt all questions from Section I and any four questions from Section II.*
- *The intended marks of questions or parts of questions are given in brackets [ ].*

SECTION - I [40 Marks]
Attempt all question from this Section

Q I.

1. A rain drop reaches the earth with constant velocity. Why? [2]
2. The stone of a hand flour grinder is provided with a handle near its rim. Why? [2]
3. A uniform metre rule of weight 10 gf is pivoted at its 0 mark [2]
   a. What moment of force depresses the rule?
   b. How can be made horizontal by applying a least force?
4. Calculate the decrease in kinetic energy of a moving body if its velocity reduces to half of the initial velocity. [2]
5. State work-energy theorem. [2]

Q II.

1. Write two differences between Watt and watt hour. [2]
2. Define moment of force and state its S.I. unit. [2]
3. A body is acted upon by a force. State two conditions under which the work done could be zero. [2]
4. State the energy changes that take place in the following when they are in use: [2]

a. Charging of a battery.

b. Explosion of crackers.

5. Name two examples in which the mechanical energy of a system remains constant. [2]

Q III.

1. Name the factors affecting the turning effect of a body. [2]

2. (i) A metal cube is hammered and turned into cuboid. Will the position of gravity remain same in both the cases? Explain.

   (ii) Where is the center of gravity of scalene triangle situated? [2]

3. Calculate the horse power of the motor of an elevator, which can carry 10 persons of average mass 60 kg through a vertical height of 20 m in 30 s [take g = 10 N/kg] [2]

4. The specific heat capacity of water is 4200 J kg^{-1} K^{-1}. What information does this convey? [2]

5. A short handle oar used for rowing a boat by a person. Which type of lever is this and write Mechanical advantage of this. [2]

Q IV.

1. What is the velocity ratio of a block and tackle pulley with 3 strands? How does the friction in the pulley bearing affect it? [2]

2. Why the pulleys in the lower block should be as light as possible. [2]

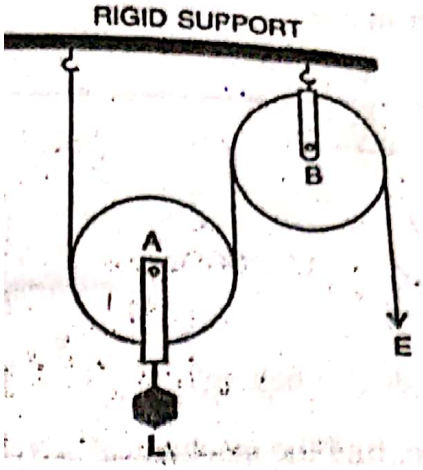
3. A ball of mass 0.20 kg is thrown vertically upwards with an initial velocity of 20m/s. Calculate the maximum potential energy it gains as it goes up. [2]

4. (i) To which class of levers does a pair of scissors and a pair of pliers belong to?

   (ii)Which one has mechanical advantage less than the other? [2]

5. (i) What is the purpose of pulley B?

   (ii) If the tension is T, deduce the relation between E and L [2]



SECTION - II (40 Marks)

Attempt any four questions from this Section.

Q V.

1. (i) Give an example of motion in which speed remains uniform, but the velocity changes.

   (ii) What type of energy is possessed by the atoms in a polyatomic molecule? [2] 3

2. 40g of water at 60°C is poured into a vessel containing 50g of water at 20°C. The final temperature of mixture is 30°C. Taking the specific heat capacity of water as 4.2 $jg^{-1}K^{-1}$, calculate the heat capacity of the vessel. [3]

3. A uniform meter rule of mass 100 g is balanced on a fulcrum at mark 40 cm by suspending an unknown mass 'm' at the mark 20 cm. [4]

   a. Find the value of m.

   b. To which side the rule will tilt if the mass 'm' is moved to the mark 10cm.

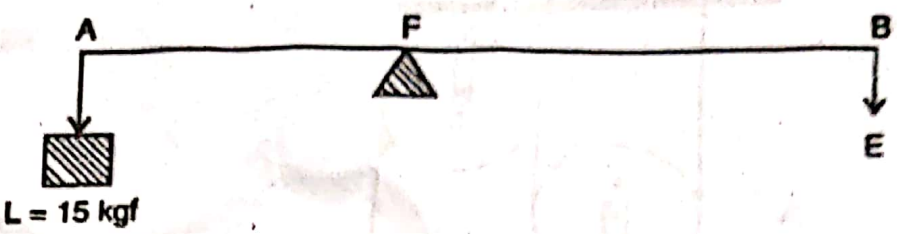
   c. What is the resultant moment now?

   d. How can it be balanced by another mass of 50g?

Q VI.

1. Draw a diagram of a block and tackle system of pulleys having a velocity ratio of 5. In your diagram indicate clearly the points of application and the directions of the load L and effort E. also mark the tension in each strand. [3]

2. Figure below shows a lever in use.



a. To which class of lever does it belong?

b. If AB = 1 m, AF =0.4 m, find the mechanical advantage.

c. Calculate the value of E.

3. A pulley system has a velocity ratio 3 and an efficiency of 80%. Draw a labeled diagram of this pulley system. Calculate : [4]

a. The mechanical advantage of the system

b. The effort required to raise a load of 300 N.

Q VII.

1. Differentiate between heat capacity and specific heat capacity. [3]

2. A body of mass moving with velocity 'v'. Derive an expression for its kinetic energy. [3]

3. In a dam, waterfalls at a rate of 1000 kg/s from a height of 100m. [4]

a. Calculate the initial potential energy of the water.

b. Assuming that 60 % of the energy of the falling water is converted into electric energy, calculate the power generated.(Take g = 9.8 m/s^2)

Q VIII.

1. (i) Give two reasons why the efficiency of single movable pulley is not 100%

(ii) State principle of lever. [3]

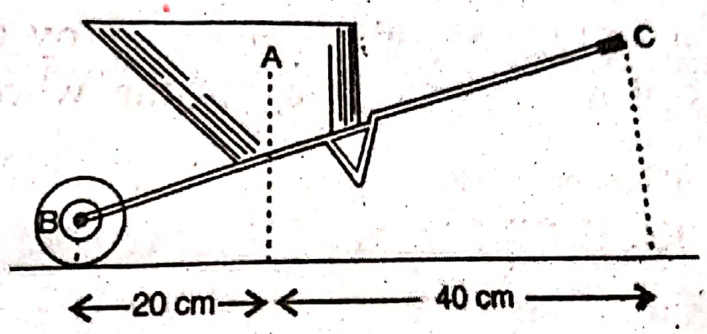
2. Draw a diagram to illustrate the position of fulcrum , load and effort in each of the following: [3]

a. A seesaw

b. A common balance

c. Sugar tongs.

3. The figure given below shows a wheel barrow of mass 15 kg carrying a load of 30 kgf with its centre of gravity at A. The points B and C are the centre of wheel and tip of the handle such that the horizontal distance AB = 20cm and AC = 40 cm. [4]



Find:

a. the load arm

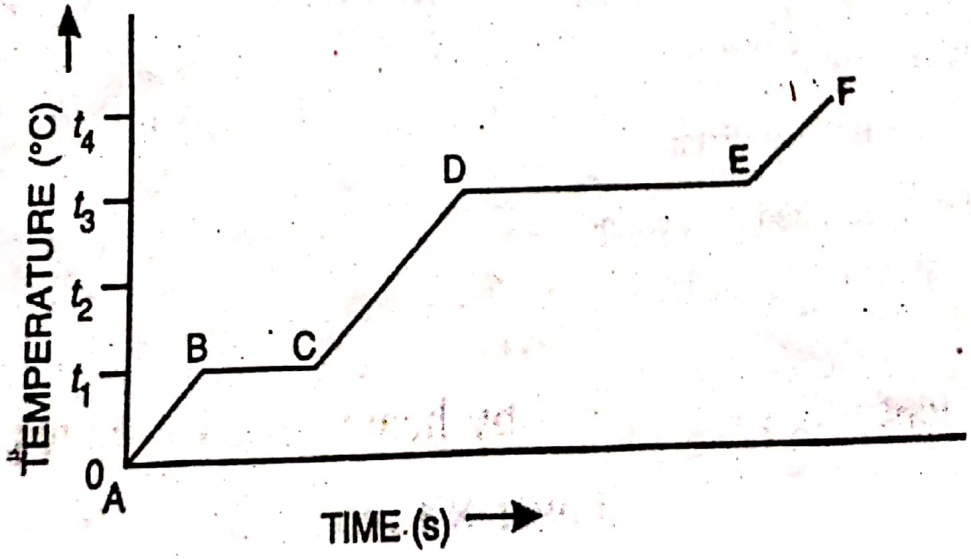
b. the effort arm

c. the mechanical advantage

d. The minimum effort required to keep the leg just off the ground.

Q IX.

1. The diagram below shows the change of phase of a substance on a temperature - time graph on heating the substance at a constant rate. [3]



a. What do the parts AB, BC, CD and DE represent?

b. What is melting point of the substance?

c. What is the boiling point of the substance?

2. Calculate the total amount of heat energy required to convert 100 g of ice at 10° C completely into water at 100°C. Specific heat capacity of ice = 2.1 $Jg^{-1}K^{-1}$, specific heat capacity of water = 4.2 $Jg^{-1}K^{-1}$ specific latent heat of ice = 336 J/g [3]

3. (i) What is calorimeter? [4]

(ii) Name the material of which it is made of. Give two reasons for using the material stated by you.

(iii) How is the loss of heat due to radiation minimized in a calorimeter?

Q X.

1. (i) Name the physical quantity measured in terms of horse power. [1]

(ii)A nut is opened by a wrench of length 20 cm. If the least force required is 2N, find the moment of force needed to loosen the nut. [2]

2. A piece of stone tied at the end of a thread is whirled in a horizontal circle with uniform speed with the help of hand. Answer the following question: [3]

a. Is the velocity of stone uniform or variable?

b. What is direction of acceleration of stone at any instant?

c. Name the force and its direction which acts on the hand.

3. Show that the sum of U and K is always conserved in case of a freely falling body under the gravity from a height h by finding it when [4]

a. the body is at top,

b. the body has fallen a distance x,

c. the body has reached the ground.

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