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Note:-

1. All Questions are compulsory.
2. Numbers on the right indicate full marks.

Section A

Select and write the correct answer

(3)

1. At a given instant three point masses m , $2m$ and $3m$ are equidistant from each other. Consider only the gravitational forces between them. Select correct statement/s for this instance only
A) mass m experiences maximum force B) mass $2m$ experiences maximum force
C) mass $3m$ experiences maximum force D) All masses experience force of same magnitude
2. A 10gm ball falls vertically on a surface at a speed of 5 m/s and rebounds with the same speed. The ball remains in contact with the surface for 0.01 s . The average force exerted by the surface on the ball is
A) 0.1 N B) 1.0 N
C) 10 N D) 100 N
3. A force of 1 kg. wt is,
A) 4.9 N B) 9.8 N
C) 19.6 N D) 1 N

Section B

Answer the following

(2)

1. Why is it difficult to catch a cricket ball than a tennis ball?
2. What is impulse? Give a few applications on the concept of impulse.

Section C

Answer any 1

(2)

1. In real life, objects never travel with uniform velocity, even on a horizontal surface unless something is done. Why is it so? What is to be done?
2. A marble of mass 2 m travelling at 6 cm/s is directly followed by another marble of mass m with double speed. After collision, the heavier one travels with average initial speed of the two calculate the coefficient of restitution.

Section D

Answer any 1

(3)

1. State the formula for calculating work done by a force. Are there any conditions or limitations in using it directly? If so, state those clearly. Is there any mathematical way out for it? Explain.

2. Figure below shows a block of mass 35 kg resting on a table. The table is so rough that it offers a self adjusting resistive force 10% of the weight of the block for its sliding motion along the table. A 20 kg wt load is attached to the block and is passed over a pulley to hang freely on the left side. On the right side there is a 2 kg wt pan attached to the block and hung freely. Weights of 1 kg wt each, can be added into the pan. Minimum how many and maximum how many such weights can be added to the pan so that the block does not slide along the table?

