

21/6/23

## Vidyasagar College For Women

Internal examination 2023

## MTMA Semester-4

Date: 21.06.2023

CC-10

Time: 7:30AM

## Mechanics

Full Marks: 10

Time: 30 min

All questions carry 2 marks (1 for correct answer and 1 for explanation)

CU Roll No.:

CU Reg. No.:

A uniform ladder  $AB=2a$  of weight  $W$ , inclined to the horizon at  $45^\circ$  rests with its upper extremity against a rough vertical wall  $OB$  and its lower extremity on the ground  $OA$ .  $G$  be the position of c.g. and  $R, S$  are the normal reaction at  $A, B$  respectively. Where  $\mu$  and  $\mu'$  are the coefficient of friction at the lower and upper end respectively. Then moment about  $A$  gives

$$(a) S = \frac{W}{2(1 + \mu')} \quad (b) S = \frac{W}{2(1 - \mu)} \quad (c) S = \frac{W}{2(1 - \mu')} \quad (d) S = \frac{W}{2(1 + \mu)}$$

2. A square frame  $ABCD$  of four equal joined rods of weight  $W$  and length  $l$  is hanging from  $A$ , the shape being maintained by the string joining mid points  $E$  and  $F$  of  $AB$  and  $CD$  respectively. If  $\angle BAC = \theta$  and  $G$  be the C.G. of the 4 rods and give the system a small virtual displacement in which  $\theta$  changes to  $\theta + \delta\theta$ , if  $T$  be the tension of string  $EF$ , then the virtual work gives

$$(a) T = 3W \quad (b) T = 2W \quad (c) T = W \quad (d) T = 4W$$

If  $h$  be the total height and  $v$  be the velocity at a height  $x$  where the K.E. is equal to the half of its P. E. , then

- (a)  $x = h$       (b)  $x = 2h$       (c)  $x = \frac{2}{3}h$       (d)  $x = \frac{4}{3}h$

4. If the radial velocity is four times the transverse velocity , then the equation of the path of the particle in polar coordinates is

- (a)  $r = ce^{3\theta}$       (b)  $r = ce^{4\theta}$       (c)  $r = ce^{2\theta}$       (d)  $r = ce^{\theta}$

5. The speed  $v$  of a point moving along the  $x$ -axis is given by  $v^2 = 16 - x^2$  . If the motion is S. H. , then the amplitude is

- (a) 2      (b) 5      (c) 3      (d) 4