

## DSE-4A(MECHANICS)

Answer all the following questions.

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1. If the time of complete oscillation of a compound pendulum is  $2\pi \sqrt{\frac{k^2}{gh}}$  then the length of simple equivalent pendulum is

- a)  $\frac{k^2}{g}$       b)  $\frac{k^2}{h}$       c)  $\frac{k^2}{gh}$       d)  $\frac{k}{h}$

- a  
 b  
 c  
 d

2. A spherical raindrop falling freely, receives in each instant an increase of volume equal to 'n' times its surface at that instant. At the end of time 't' the distance fallen through in that time if 'n' be the initial radius of the raindrop is

- a)  $\frac{gt^2}{5} \left\{ \frac{(3+t)}{(1-t)^2} \right\}$     b)  $\frac{gt^2}{8} \left\{ \frac{(2-t)}{(1+t)^2} \right\}$     c)  $\frac{gt^2}{8} \left\{ \frac{(2+t)}{(1+t)^2} \right\}$     d)  $\frac{gt^2}{5} \left\{ \frac{(3+t)}{(1+t)^2} \right\}$

- a  
 b  
 c  
 d



3. A heavy particle is projected in a resisting medium. If  $v$  be the velocity at any time ' $t$ ' and  $\theta$  the inclination to the vertical of the direction of the motion and ' $f$ ' the retardation, then

$$\begin{aligned} \text{a) } \frac{1}{v} \left( \frac{dv}{d\theta} \right) - \cot \theta + \frac{f}{g \cos \theta} &= 0 & \text{b) } \frac{1}{v} \left( \frac{dv}{d\theta} \right) + \cot \theta + \frac{f}{g \sin \theta} &= 0 \\ \text{c) } \frac{1}{v} \left( \frac{dv}{d\theta} \right) - \sin \theta + \frac{f}{g \sin \theta} &= 0 & \text{d) } \frac{1}{v} \left( \frac{dv}{d\theta} \right) + \tan \theta + \frac{f}{g \sin \theta} &= 0 \end{aligned}$$

- a
- b
- c
- d

4. A square frame ABCD of four equal joined rods is hanging from A, the shape being maintained by a string joining mid points of AB and BC. The ratio of tension of the string to the reaction at C is

$$\text{a) } \frac{2}{\sqrt{5}} \quad \text{b) } \frac{8}{\sqrt{5}} \quad \text{c) } \frac{4}{\sqrt{5}} \quad \text{d) } \frac{7}{\sqrt{5}}$$

- a
- b
- c
- d



5. Forces 1,2,3 units act along any three mutually perpendicular generators of the same system of surfaces  $x^2 + y^2 - 32 = 2z^2$ , the positive direction of the forces being towards the same side of the plane. The pitch of the Wrench is

a)  $\frac{44}{5}$

b)  $\frac{44}{7}$

c)  $\frac{43}{7}$

d)  $\frac{49}{5}$

 a b c d

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