

NEET LAWS OF MOTION — DYNAMICS OF CIRCULAR MOTION (BANKING OF ROADS, CONICAL PENDULUM) — PYQS

Max. Marks: 52
Questions: 13

Section A (MCQ) — 13 questions

Q.1 A car travels on a circular racetrack of radius 50 m, which is banked at an angle θ . If the car travels at a speed 10 ms^{-1} , then the wear and tear on its tyres is minimum. Taking the acceleration due to gravity to be 10 ms^{-2} , the value of θ is: [RE-NEET (UG) 2026]

- (1) $\tan^{-1}(2\sqrt{3})$ (2) $\tan^{-1}\left(\frac{1}{5}\right)$
 (3) $\tan^{-1}\left(\frac{2}{5}\right)$ (4) $\tan^{-1}(\sqrt{3}/2)$

Scan or tap for the full solution



Q.2 A bob is whirled in a horizontal plane by means of a string with an initial speed of ω rpm. The tension in the string is T . If speed becomes 2ω while keeping the same radius, the tension in the string becomes:

[NEET (UG) 2024]

- (1) T (2) $4T$ (3) $\frac{T}{4}$ (4) $\sqrt{2}T$

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Q.3 A bob is whirled in a horizontal circle by means of a string at an initial speed of 10 rpm. If the tension in the string is quadrupled while keeping the radius constant, the new speed is: [RE-NEET (UG) 2024]

- (1) 20 rpm (2) 40 rpm (3) 5 rpm (4) 10 rpm

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Q.4 A block of mass 10 kg is in contact against the inner wall of a hollow cylindrical drum of radius 1 m. The coefficient of friction between the block and the inner wall of the cylinder is 0.1. The minimum angular velocity needed for the cylinder to keep the block stationary when the cylinder is vertical and rotating about its axis, will be : ($g = 10 \text{ m/s}^2$)

[NEET (UG) 2019]

- (1) $\frac{10}{2\pi} \text{ rad/s}$ (2) 10 rad/s
 (3) $10\pi \text{ rad/s}$ (4) $\sqrt{10} \text{ rad/s}$

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Q.5 One end of string of length l is connected to a particle of mass ' m ' and the other end is connected to a small peg on a smooth horizontal table. If the particle moves in circle with speed ' v ', the net force on the particle (directed towards centre) will be (T represents the tension in the string) [NEET 2017]

- (1) $T + \frac{mv^2}{l}$ (2) $T - \frac{mv^2}{l}$
 (3) zero (4) T

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Q.6 A car is negotiating a curved road of radius R . The road is banked at an angle θ . The coefficient of friction between the tyres of the car and the road is μ_s . The maximum safe velocity on this road is

[NEET 2016 (Phase 1)]

- (1) $\sqrt{\frac{g}{R} \frac{\mu_s + \tan \theta}{1 - \mu_s \tan \theta}}$ (2) $\sqrt{\frac{g}{R^2} \frac{\mu_s + \tan \theta}{1 - \mu_s \tan \theta}}$
 (3) $\sqrt{gR^2 \frac{\mu_s + \tan \theta}{1 - \mu_s \tan \theta}}$ (4) $\sqrt{gR \frac{\mu_s + \tan \theta}{1 - \mu_s \tan \theta}}$

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Q.7 Two stones of masses m and $2m$ are whirled in horizontal circles, the heavier one in a radius $\frac{r}{2}$ and the lighter one in radius r . The tangential speed of lighter stone is n times that of the value of heavier stone when they experience same centripetal forces. The value of n is

[AIPMT 2015]

- (1) 4 (2) 1 (3) 2 (4) 3

Scan or tap for the full solution



Q.8 A car is moving in a circular horizontal track of radius 10 m with a constant speed of 10 m/s. A bob is suspended from the roof of the car by a light wire of length 1.0 m. The angle made by the wire with the vertical is

[NEET 2013 (Karnataka)]

- (1) $\frac{\pi}{3}$ (2) $\frac{\pi}{6}$ (3) $\frac{\pi}{4}$ (4) 0°

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- Q.9** A car of mass m is moving on a level circular track of radius R . If μ_s represents the coefficient of static friction between the road and tyres of the car, the maximum speed of the car in circular motion is given by [AIPMT 2012 (Mains)]

(1) $\sqrt{\mu_s m R g}$ (2) $\sqrt{\frac{R g}{\mu_s}}$
 (3) $\sqrt{\frac{m R g}{\mu_s}}$ (4) $\sqrt{\mu_s R g}$

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- Q.10** A car of mass 1000 kg negotiates a banked curve of radius 90 m on a frictionless road. If the banking angle is 45° , the speed of the car is [AIPMT 2012 (Prelims)]

(1) 20 m s^{-1} (2) 30 m s^{-1} (3) 5 m s^{-1} (4) 10 m s^{-1}

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- Q.11** A gramophone record is revolving with an angular velocity ω . A coin is placed at a distance r from the centre of the record. The static coefficient of friction is μ . The coin will revolve with the record if [AIPMT 2010 (Prelims)]

(1) $r = \mu g \omega^2$ (2) $r < \frac{\omega^2}{\mu g}$ (3) $r \leq \frac{\mu g}{\omega^2}$ (4) $r \geq \frac{\mu g}{\omega^2}$

Scan or tap for the full solution



- Q.12** A roller coaster is designed such that riders experience "weightlessness" as they go round the top of a hill whose radius of curvature is 20 m. The speed of the car at the top of the hill is between [AIPMT 2008]

(1) 16 m/s and 17 m/s (2) 13 m/s and 14 m/s
 (3) 14 m/s and 15 m/s (4) 15 m/s and 16 m/s

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- Q.13** A tube of length L is filled completely with an incompressible liquid of mass M and closed at both the ends. The tube is then rotated in a horizontal plane about one of its ends with a uniform angular velocity ω . The force exerted by the liquid at the other end is [AIPMT 2006]

(1) $\frac{M L^2 \omega^2}{2}$ (2) $\frac{M L \omega^2}{2}$
 (3) $\frac{M L^2 \omega}{2}$ (4) $M L \omega^2$

Scan or tap for the full solution



ANSWER KEY

Ques.	1	2	3	4	5	6	7	8	9	10	11
Ans.	2	2	1	2	4	4	3	3	4	2	3
Ques.	12	13									
Ans.	3	2									