

Q1. A rear wheel drive tractor wheel weighing 18KN has the static weight divided in such a way that 12 KN in on the rear wheels and 6KN on the front wheels. The Tractor is pulling a plough at a speed of 5 km/hr . The Plough exerts an inclined drawbar pull of 10 KN with the line of pull making an angle of 15 degree with the horizontal . The axle power is 20 KW and the wheel base of the tractor is 2100mm and hitch height is 500mm Calculate (a) The dynamic weight on the rear axle is

(b) The tractive efficiency of the tractor is [GATE 2003]

Q2. A rear wheel drive tractor wheel weighing 20 KN has 40 percent of his supported by the front wheels. The Tractor is pulling a plough at a speed of 8 km/hr . The Plough exerts an inclined drawbar pull of 8 KN with the line of pull making an angle of 15 degree with the horizontal . The Coefficient of rolling resistance is 0.04 and the wheel base of the tractor is 2100mm and hitch height is 500mm

Calculate (a) The coefficient of traction

(b) If the wheel slip is 20 percent, find out the tractive efficiency [GATE 2008]

Q3. A rear wheel drive tractor wheel weighing 23 KN has a wheel base of the 2100mm and centre of gravity is 710mm ahead of rear axle centre line . The Tractor is pulling a implement at a speed of 6 km/hr . The implement exerts an drawbar pull of 15 KN and the hitch height is 485mm . The axle power is 33.3 KW. Determine

(a) Weight transfer on rear axle

(b) The coefficient of traction

(c) tractive efficiency [GATE 1999]

Q4. A 2 wheel drive 35 hp tractor has 1.5 m rear wheel diameter. The engine runs at 1200 rev / min and the total reduction of the speed is 30 : 1,. Find out the travelling speed of the tractor and the tractive force at each driving wheel.

[GATE 1992]

Q5. A 35 kW two-wheel drive tractor weighing 20 kN is fitted with 6-16 8PR tyre at the front axle and 13.6-28 12PR tyre at the rear axle. The ratio of section height and section width for all tyres is 0.75. The tractor has a wheel base of 2.1 m and the center of gravity is located 0.7 m ahead of the rear axle center on a horizontal plane. The tractor is to be towed on a level ground having sandy clay loam soil at 10% moisture content with a cone index of 1200 kPa.

[GATE 2007]

The wheel numeric for each of the rear wheels is

(A) 39.50 (B) 58.17 (C) 79.01 (D) 116.37

Rolling resistance of each of the front wheels is

(A) 0.244 kN (B) 0.354 kN (C) 0.575 kN (D) 0.707 kN

Q6. A two-wheel drive tractor is pulling a load of 12 kN horizontally on a leveled surface at a forward speed of 5.0 km h⁻¹. The rolling radius of the traction wheel and wheel slip are 0.65 m and 20% respectively. If the rear axle torque is 9 kN m, the tractive efficiency

(A) 56.7% (B) 62.1% (C) 69.3% (D) 78.5% . [GATE 2009]

Q7. The diameter of an undeflected tractor wheel fitted with 13.6 — 28, 12 PR tyre with an aspect ratio of 0.75 is [GATE 2009]

(A) 0.99 m (B) 1.05 m
(C) 1.23 m (D) 1.40 m

Q8. A 37 kW two-wheel drive tractor weighing 20 kN with a wheel base of 2.1 m is having the option to be fitted with either 12.4 - 2 12PR or 13.6 - 28 12 PR at the rear axle. The ratio of section height and section width for all tyres is 0.75. On a level ground the weight distribution on the front and rear axles is 35 and 65% of the total tractor weight, respectively. Cone index of soil is 1200 kPa.

The motion resistance ratio of each of the rear wheels when fitted with the above-mentioned tyres at normal tyre inflation pressure while moving on a level ground will be [GATE 2010]

(A) 0.04. (1.04 (8)0.047. 0..055 (C) 0.051. 0.049 (D) 0,057. 0.055

Net traction developed in kN by the rear wheels when fitted with 13.6 - 28 12 PR tyre at normal inflation pressure on a level ground with 15% wheel slip will be

(A) 8.79 (B) 9.18 (C) 9.78 (D) 10.32

Q9. A towed pneumatic wheel (width to diameter ratio of 0.3) is to be rolled on a levelled concrete surface. Total wheel load is 2000 N. [GATE 2011]

The force in N required to roll the wheel on the horizontal concrete surface would be

(A) 80 (B) 91 (C) 800 (D) 912

The minimum slope in degrees of the concrete surface with respect to the horizontal at which the

Wheel itself will start rolling downward is

(A) 2.29 (B) 5.28 (C) 23.58 (D) 27.13

Q10. Which one of the following is NOT a towed wheel? [GATE 2011]

(A) wheels of power tiller (B) front wheels of two wheel drive tractor
(C) wheels of bullock cart (D) wheels of trailer

Q11. Which one of the following statements is NOT appropriate regarding cone index [GATE 2012]

(A) 1.48

(B) 14.46

(C) 39.04

(D) 85.54

- (A) It reflects strength of soil
- (B) It is a composite parameter
- (C) It is dimensionless
- (D) It is measured at a constant penetration rate of 30 mm/s

Q12. A two wheel drive tractor, weighing 15.84 kN with a wheel base of 2160 mm, has the static weight divided between the front and rear axles in the ratio of 30 : 70 on a horizontal level surface. The hitch point is at a height of 700 mm from the ground and at a horizontal distance of 120 mm to the rear side from the center of the rear axle. Pull acts at an angle of 12° downwards from the horizontal. The maximum pull in kN, when the front wheels would just start rising from the ground is [GATE 2012]

Q13. A four-wheel-drive tractor has a static weight of 50 kN with 40% weight on rear axle. The wheel base is 2 m. The tractor is pulling a disc harrow that exerts a level drawbar height of 0.5 m from the ground. During the operation, when the dynamic reaction on each dynamic traction ratio developed by the tractor is [GATE 2014]

(A) 0.2

(B) 0.4

(C) 0.5

(D) 0.8

Q14. A tractor weighing 21 kN has 70% static weight on rear axle and its wheel base is 1.8 m. The drawbar hitch is located 25 cm behind the rear axle centre and 35 cm above the ground level. To overcome longitudinal instability, the front end loading is provided at a distance of 20 cm ahead of the front axle centre. It is observed that, there is front-end instability in the tractor due to a pull of 30 kN inclined at 20° downward from the horizontal. A minimum front-end load required to overcome the instability in N is [GATE 2016]

Q15. A two-wheel drive tractor weighing 18 kN has a wheel base 1.8 m. Its centre of gravity is located 600 mm ahead of the rear axle centre, under static condition, on a level ground. When this tractor is used to pull a disc plough hitched at a height of 390 mm from the ground, the draft observed is 6 kN. The change in reaction on rear wheels of the tractor due to pull in kN is [GATE 2018]

(A) 1.30 (B) 1.95 (C) 3.90 (D) 5.85

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