

### Numerical

Q1. In an epicyclic gear train the arm carries two wheels 'A' and 'B' having 24 teeth and 30 teeth respectively. If the arm rotates 100 rpm in the clockwise direction and the wheel A is fixed, find out the speed of the wheel on its own axis [gate 2008]

Q2. Find the gear ratio of a tractor if final drive has 1.2 m tractor wheel and forward speed of 5 km/hr. The engine is running at 1000 rpm and if the reduction in transmission is 3:1 [GATE 1990]

Q3. The differential in the rear axle of a farm tractor has a ring gear with 32 teeth driven by a bevel pinion with 8 teeth. The final drive speed reduction is 5: 1 and the input speed of the bevel pinion is 520 rpm. Calculate the speed of left and right wheel if the left wheel encounters poor traction and being turning 50 percent faster than the right wheel. [GATE 2001]

Q4. A flange mounted shear pin is used on a shaft as a safety device. The steel shear pin has a diameter of 2.38 mm and is to be mounted on the flange of a shaft rotating at 650 rpm. The maximum power transmitted by the shaft is 4.5 kW. If the shear strength of the material of pin is 310 MPa, the radial distance of its mounting is

(A) 5.02 mm (B) 11.98 mm (C) 47.94 mm (D) 301.20 mm [GATE 2007]

Q5. As per ASABE standards, the three-point hitch of a two-wheel drive tractor with maximum drawbar power of 45 kW comes under the category [GATE 2007]

(A) I (B) 11 (C) 111 (D) IV

Q6. The final drive system of a tractor comprised a planetary gear drive. The ring gear has 70 teeth and is held stationary. Power comes into the sun gear which has 34 teeth and rotates clockwise at 100 rpm. Power comes out of the gear set on the planet carrier which drives the rear axle shaft. The speed of the rear axle in rpm is [GATE 2009]

(A) 32.7 (B) 47.0 (C) 54.4 (D) 71.4

Q7. As per BIS standard, the power tests for tractor PTO includes [GATE 2009]

- (A) Maximum power, varying load and varying speed tests
- (B) Varying speed and maximum power tests
- (C) Varying load and varying speed tests
- (D) Varying load and maximum power tests

Q8. In a tractor differential, the pinion on the propeller shaft has 12 teeth and the crown gear has 60 teeth. The propeller shaft rotates at 1000 rpm and the right rear axle rotates at 210 rpm while taking a left turn. The rotation of the left rear axle in rpm will be [GATE 2010]

- (A) 170                      (B) 180                      (C) 190                      (D) 200

Q9. A slider is moving on a straight link at a sliding velocity of  $0.5 \text{ m s}^{-1}$ . The straight link is pivoted at one end and makes angular movement at a rate of  $1.0 \text{ rad s}^{-1}$ . Coriolis acceleration of the slider in  $\text{m s}^{-2}$  is [GATE 2012]

- (A) 0.25                      (B) 0.50                      (C) 1.00                      (D) 4.00

Q10. A tractor gear box has 8 forward speeds. The speed ratios (number of engine revolutions for one revolution of driving wheel) vary in exact geometrical progression. If the speed ratios in highest and lowest gears are 14.9 and 108.8, respectively, the geometric constant is \_\_\_\_\_. [GATE 2014]

Q11. The speed reductions in the 1st low gear of a tractor gearbox and differential with final drive are 5:1 and 40:1, respectively. For the tractor developing 24 kW power at an engine rpm of 2000 with an overall power transmission efficiency of 80%, the total torque in kN m available at the wheel axle will be

- (A) 22.92 (B) 28.64 (C) 16.54 (D) 18.33 [GATE 2015]

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