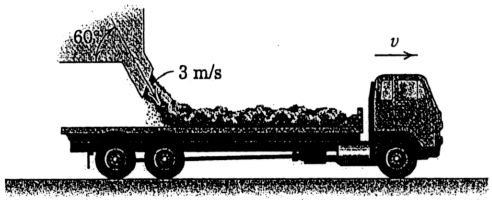
國立中央大學99學年度碩士班考試入學試題卷

所別：生物醫學工程研究所碩士班 不分組(一般生)　科目：工程力學　共 [redacted] 頁 第 [redacted] 頁

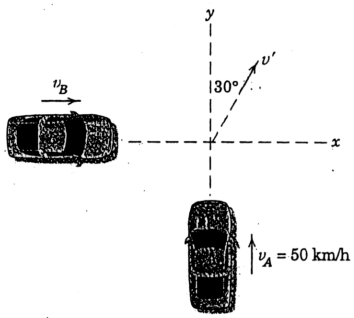
＊請在試卷答案卷（卡）內作答

本科考試可使用計算器，廠牌、功能不拘

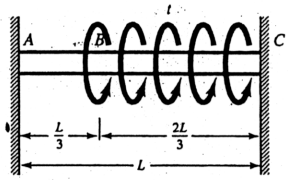
1. At a bulk loading station, gravel leaves the hopper at rate of 100 kg/s with a velocity of 3 m/s in the direction shown and is deposited on a the moving flatbed truck. The tractive force between the driving wheels and the road is 1.7 kN, which overcomes the 900 N of frictional road resistance. Draw the corresponding free-body diagram and determine the acceleration a of the truck 4 seconds after the hopper is opened over the truck bed, at which instant the truck has a forward speed of 2.5 km/h. The mass of the empty truck is 5400kg. (25%)



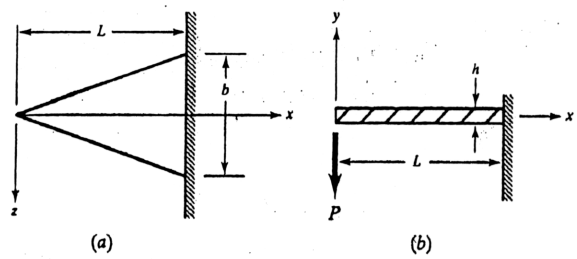
2. The two cars collide at right angles in the intersection of two icy roads. Car A has a mass of 1200 kg and B of 1600 kg. The cars become entangled and move off together after collision with a velocity v' in the direction indicated. If car A was traveling 50 km/h at the instant of impact, calculate the corresponding velocity of car B just before impact. (25%)



3. A solid circular cross-section shaft is clamped at both ends and loads by twisting moment t per unit length as shown. Determine the reactive twisting moments at each end of the bar. (25%)



4. A cantilever beam when viewed from the top [see Fig (a)] has a triangular configuration. The thickness h of the beam is constant, as shown in the side view Fig. (b). determine the deflection of the beam due to a concentrated load P at the tip. Neglect the weight of the beam. (25%)



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