

國立臺北科技大學 104 學年度碩士班招生考試

系所組別：1120、1131 機電整合研究所乙、丙組

第三節 工程力學 試題 (丙組選考)

第一頁 共一頁

注意事項：

1. 本試題共 4 題，配分共 100 分。
2. 請標明大題、子題編號作答，不必抄題。
3. 全部答案均須在答案卷之答案欄內作答，否則不予計分。

1. A six-bar linkage is shown in Fig. 1. All links have negligible mass and the frictions are negligible. If the magnitude of the input force, F_{in} , is 600 N, find the magnitude of the output force, F_{out} . (25%)

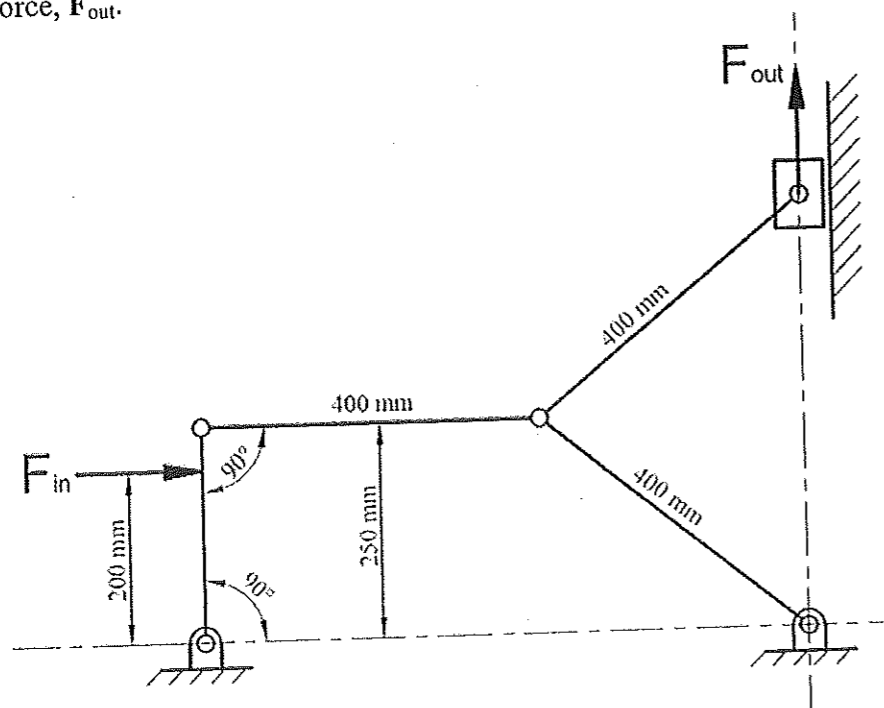


Fig. 1

2. The helicopter starts from rest at $t = 0$ (shown in Fig. 2). The Cartesian components of its acceleration are $a_x = 0.6t \text{ m/s}^2$ and $a_y = 1.8 - 0.36t \text{ m/s}^2$, where t is in seconds. Determine the tangential and normal components of the acceleration at $t = 6 \text{ s}$. (25%)

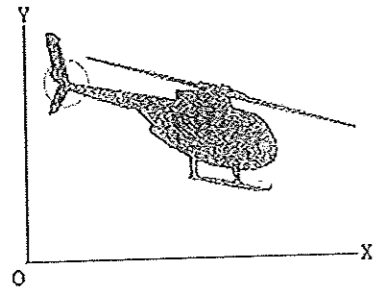


Fig. 2

3. As shown in Fig. 3, the motor M exerts a constant force P on the cable wrapped around the reel's outer rim to lift the 50-kg cylinder. The reel has a mass of 25 kg, and the radius of gyration about its center of mass A is $\kappa_A = 125$ mm. Initially, the system is at rest. If the velocity of the cylinder is 2 m/s after it has traveled a distance of 2 m, determine the required power that must be supplied to the motor at the instant. (25%)

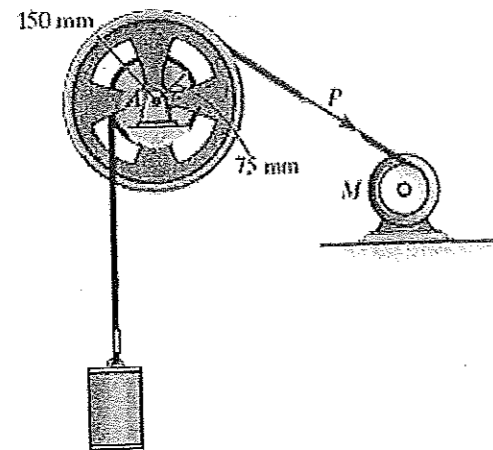


Fig. 3

4. The fork lift shown in Fig. 4 has a boom with a mass of 600 kg and a mass center at G . If the vertical acceleration of the boom is 2.5 m/s^2 , determine the horizontal and vertical reactions at the pin A and on the short link BC when the 1000 kg load is lifted. (25%)

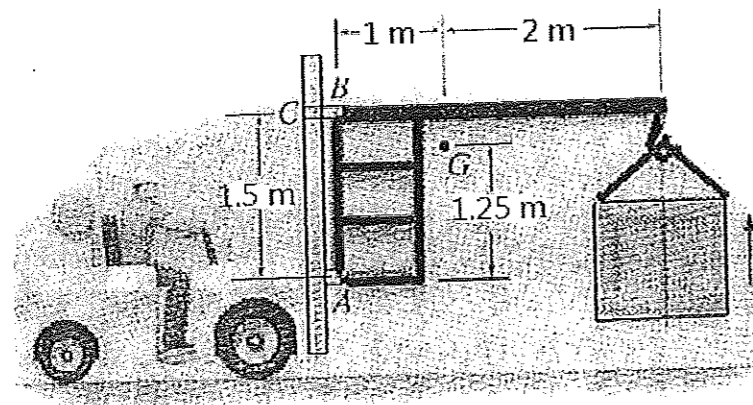


Fig. 4