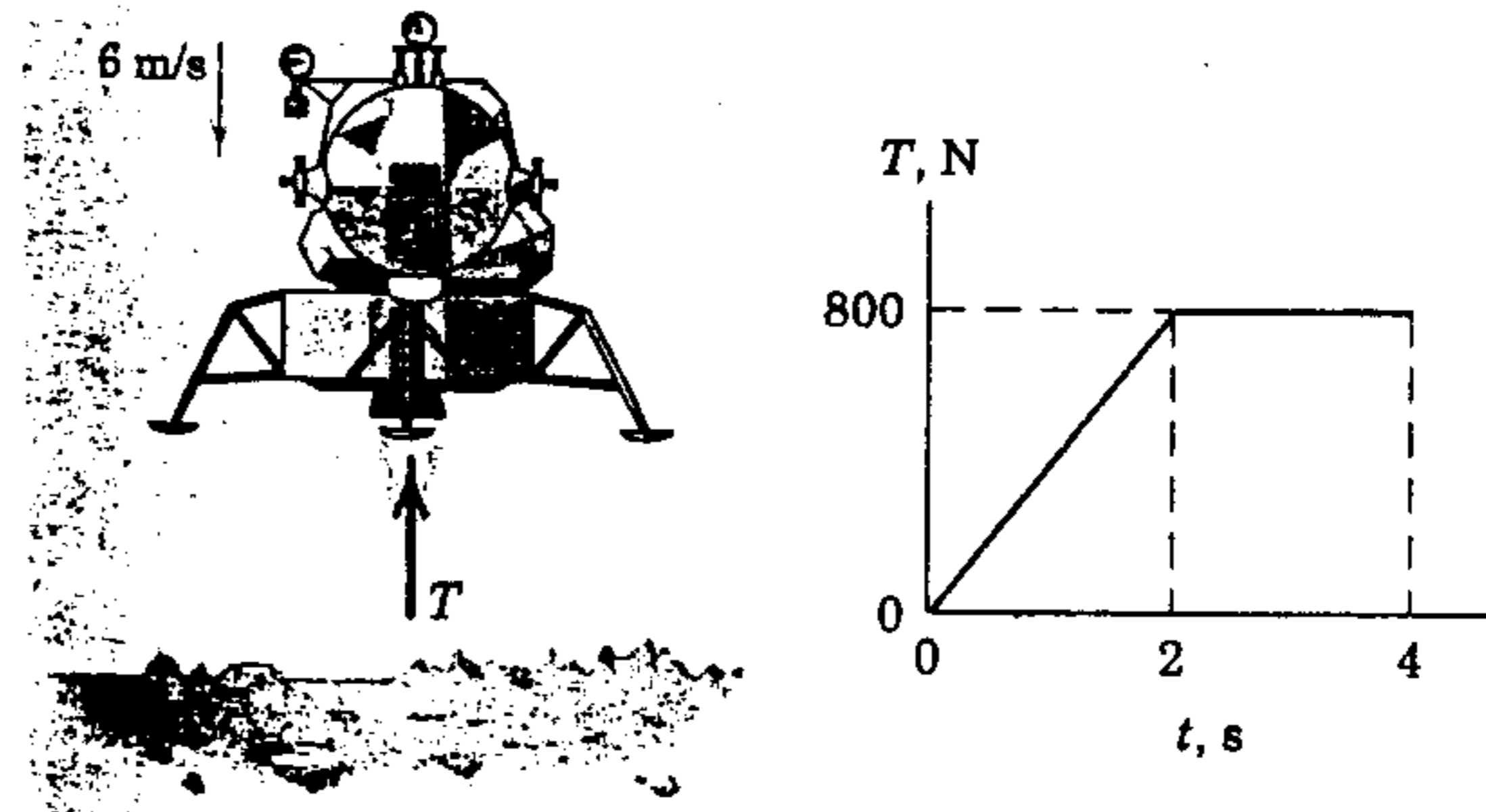


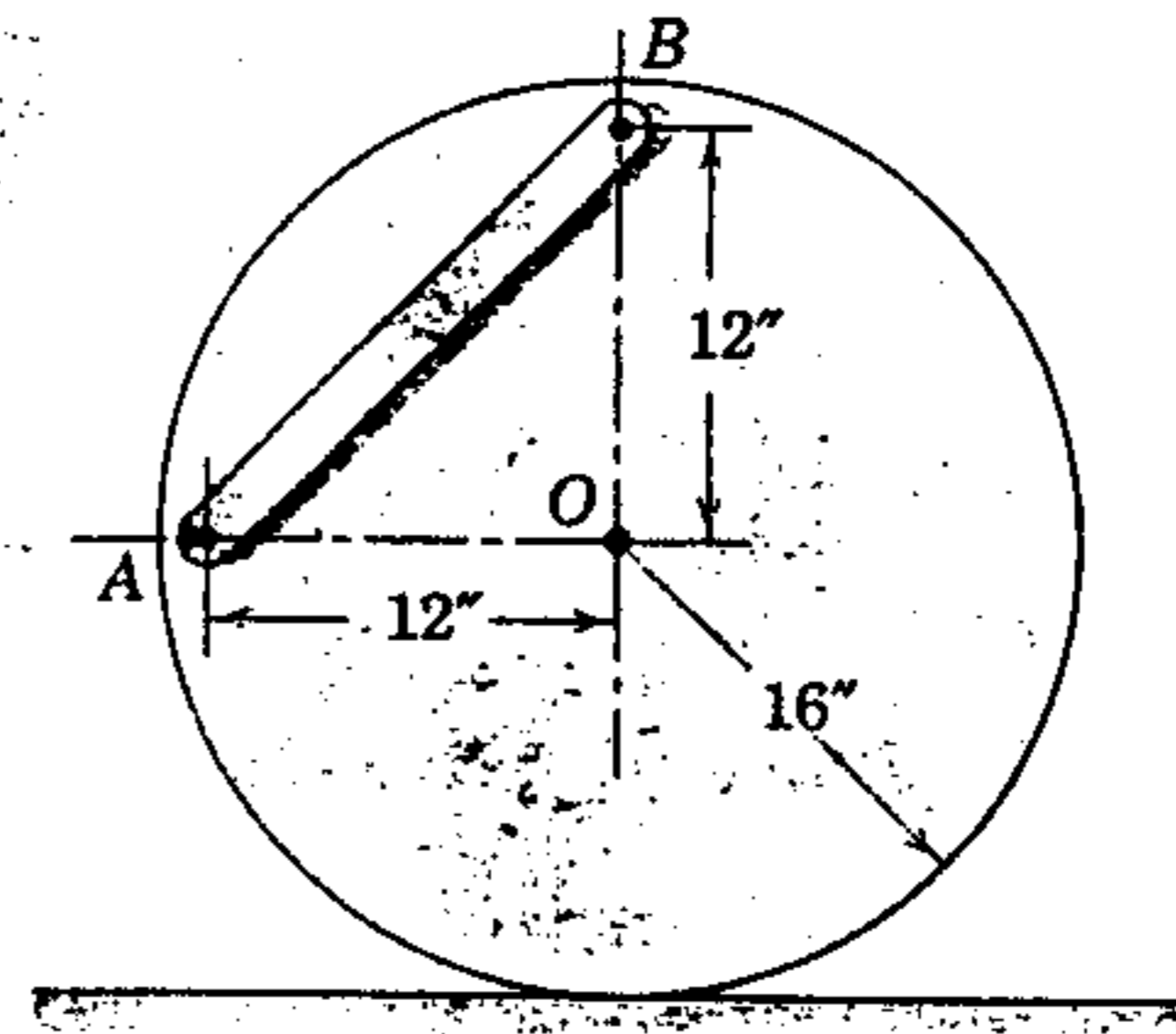
國立臺灣科技大學
九十學年度碩士班招生考試試題

系所組別：機械工程系組丁組
科 目：動力學

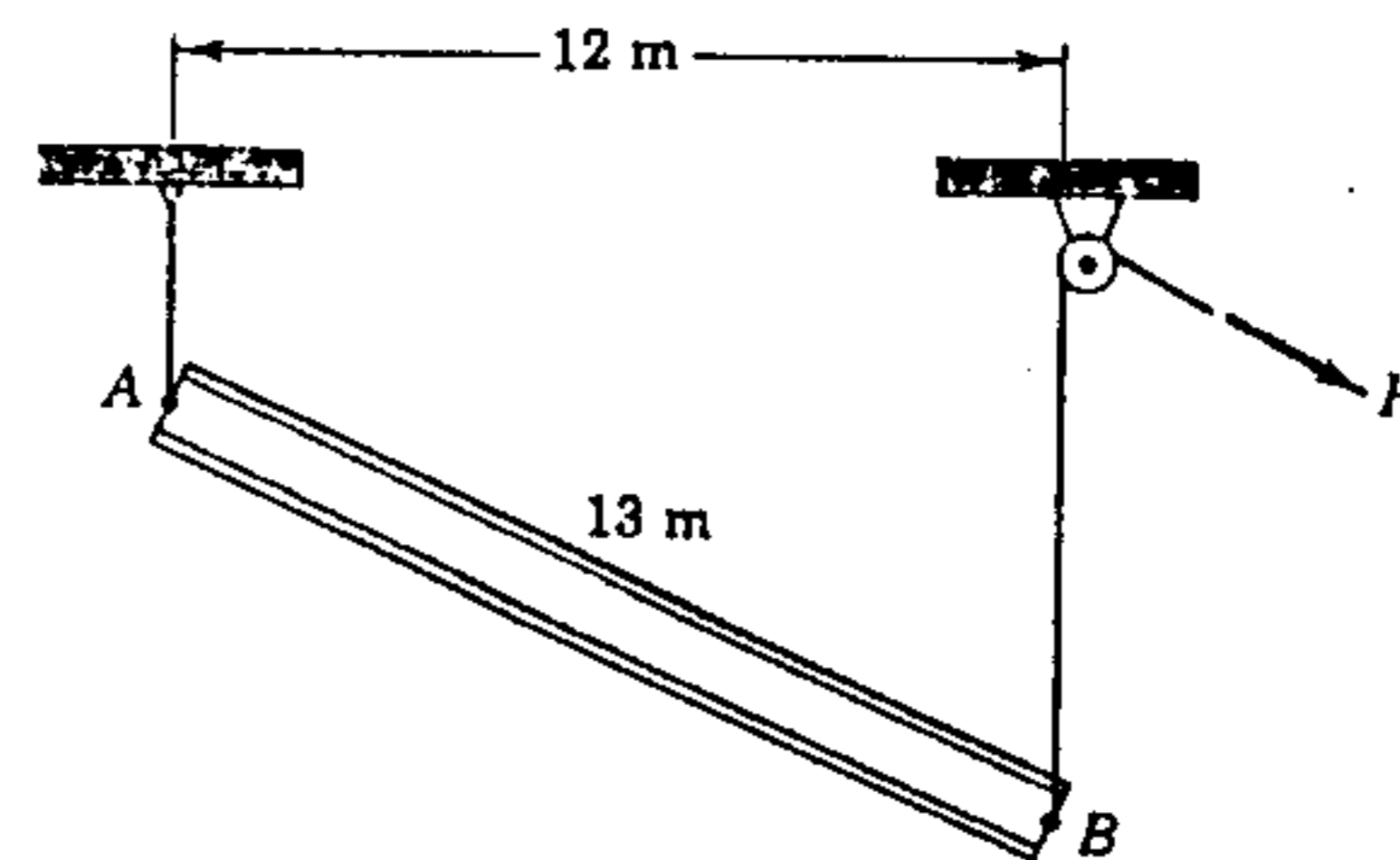
1. The 200-kg lunar lander is descending onto the moon's surface with a velocity of 6 m/s when its retro-engine is fired. If the engine produces a thrust T for 4 s that varies with the time as shown and then cuts off, calculate the velocity of the lander when $t = 5$ s, assuming that it has not yet landed. Gravitational acceleration at the moon's surface is 1.62 m/s^2 . (25%)



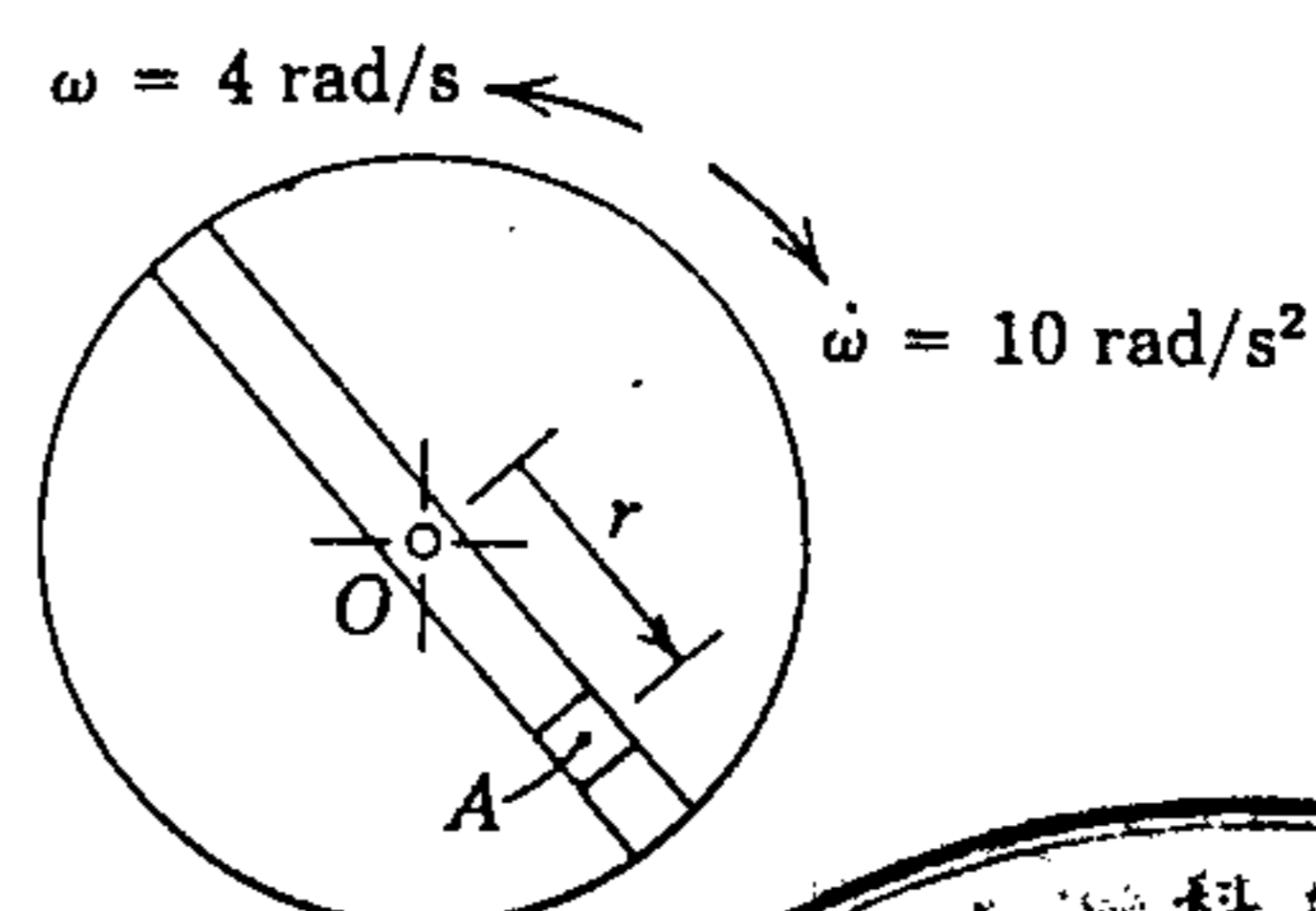
2. The 100-lb uniform circular disk with its attached 20-lb slender bar is released from rest in the position shown and rolls without slipping on the horizontal surface. Calculate the velocity v_o of the center O when the mass center of the bar is directly below the center O of the disk. (25%)



3. The 50-kg steel I-beam is supported in the fixed position shown by the force P . If the cable at B suddenly breaks, calculate the tension T in the vertical cable at A immediately after the break. (25%)



4. At the instant represented, the disk with the radial slot is rotating about O with a counterclockwise angular velocity of 4 rad/s which is decreasing at the rate of 10 rad/s^2 . The motion of slider A is separately controlled, and at this instant, $r = 150$ mm, $\dot{r} = 125 \text{ mm/s}$, and $\ddot{r} = 2025 \text{ mm/s}^2$.



Determine the absolute velocity and acceleration of A for this position. (25%)

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