

大葉大學 95 學年度 研究所碩士班 招生考試試題紙

| 系 所 別 | 組 別 | 考 試 科 目 (中文名稱) | 考 試 日 期 | 節 次 | 備 註 |
|------------|-----|-------------------|------------|-----|------------------------------|
| 機械工程研究所碩士班 | 甲組 | 應用力學 | 4月23日 | 第二節 | 1. 可使用不可程式計算機 2. 答題須列計算步驟 |

註：考生可否攜帶計算機或其他資料作答，請在備註欄註明（如未註明，一律不准攜帶）

10:30 ~ 12:00 共二頁

1. Blocks **A** and **B** have a mass of 40 kg and 30 kg, respectively, rest on smooth as shown in Fig.1. They are connected by a weightless cord passing over a frictionless pulley. Determine the angle θ and the tension in the cord for equilibrium. (20%)

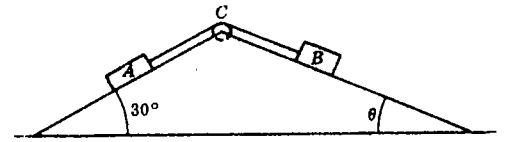


Fig.1

2. Block **B** rests on block **A** and is attached by a horizontal rope **BC** to the wall as shown in Fig.2. What force **P** is necessary to cause motion of **A** to impend? The coefficient of friction between **A** and **B** is $1/4$, and between **A** and the floor is $1/3$. **A** has a mass of 14 kg and **B** has a mass of 9 kg. (20%)

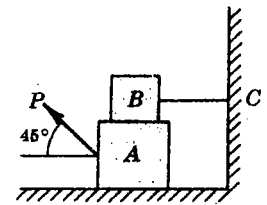


Fig.2

3. A girl, having a mass of 15 kg, sits motionless relative to the surface of a horizontal platform at a distance of $r = 5$ m from the platform's center as shown in Fig.3. (a) If the angular motion of the platform is slowly increased so that the girl's tangential component of acceleration can be neglected, determine the maximum speed which the girl will have before she begins to slip off the platform. (b) If the platform starts rotating from rest so that the girl's speed is increased uniformly at $\dot{v} = 0.5 \text{ m/s}^2$, determine the maximum speed which the girl will have before she begins to slip off the platform. (The coefficient of static friction between the girl and the platform is $\mu = 0.2$.) (20%)

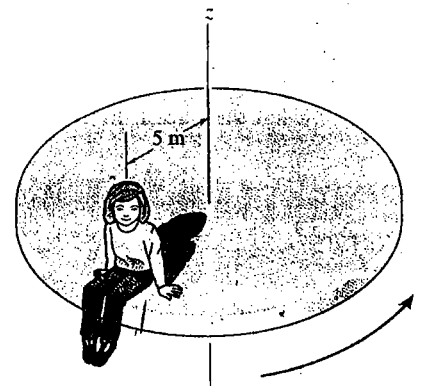


Fig.3

4. The 7 kg block shown Fig.4 is released from rest and slides a distance s down the inclined plane. It strikes the spring which it compresses 75 mm before motion impended up the plane. Assuming the coefficient of friction is 0.25 and the spring constant $k = 2.8 \text{ N/mm}$, determine the value of s . (20%)

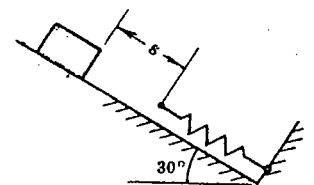


Fig.4

5. Determine the velocity of the slider block at **C** at the instant $\theta = 45^\circ$ as shown in Fig.5, if link **AB** is rotating at 4 rad/s. (20%)

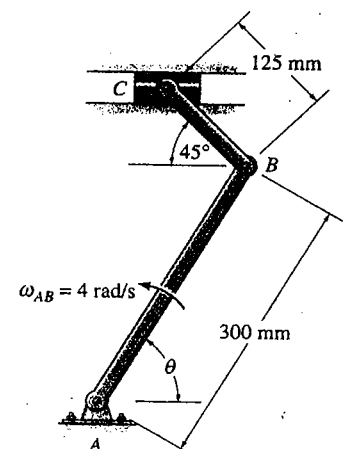


Fig.5