淡江大學 100 學年度轉學生招生考試試題

42-21

系別：機械與機電工程學系三年級　　科目：工程力學(含靜力學、動力學、材料力學)

考試日期：7 月 19 日(星期二) 第 3 節　　本試題共 4 大題， 2 頁

本試題雙面印刷

1.(25%) The beam shown in Fig. 1 is fixed at the left end and supported by a roller at the point B. A concentrated force P is applied at the right end.

a) Draw the free body diagram of the entire beam. Can we determine all reaction forces and moments by using equilibrium equations?

b) If the beam is cut vertically at the point A, draw two free body diagrams, one to the left and one to the right of A. Can we determine all internal forces and moments at A by using equilibrium equations?

c) Draw two free body diagrams if the beam is cut vertically at the point C. Can we determine all internal forces and moments at C by using equilibrium equations?

d) Is this a statically determinate beam? Why?

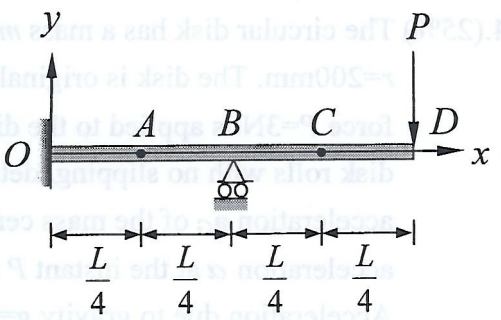

Figure 1

2.(25%) An axially loaded bar consists of two prismatic segments having the same length L and the same modulus of elasticity E. Cross section areas of the two segments are A_1 and A_2. The bar is fixed at both ends and originally the bar is not loaded. As the right end B moves to the right by a distance Δ to the position B'. Determine

a) Forces in segment ① and segment ②.

b) Stresses in segment ① and segment ②.

c) Strains in segment ① and segment ②.

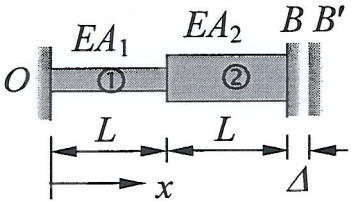

Figure 2

3.(25%) Figure 3 shows a slider crack mechanism with the following link lengths: L_2=150mm, L_3=200mm. At the instant shown in the figure, coordinates of joint B are (x_B, y_B)=(90,120)mm, coordinates of joint C are (x_C, y_C)=(250 , 0)mm, and link ② rotates with an angular velocity ω_2= 4 rad/s. Determine angular velocity ω_3 of link ③ and velocity v_c of the slider.

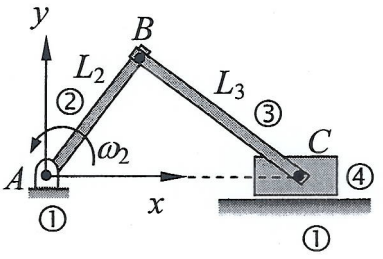

Figure 3

背面尚有試題

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4.(25%) The circular disk has a mass m=2.5kg and a radius r=200mm. The disk is originally at rest when a force P=3N is applied to the disk. Assuming the disk rolls with no slipping, determine the angular acceleration $\mathbf{a}_G$ of the mass center G and angular acceleration α at the instant P is applied. Acceleration due to gravity g=9.81m/s^2, and centroidal mass moment of inertia about the z axis is given by $mr^2/2$.

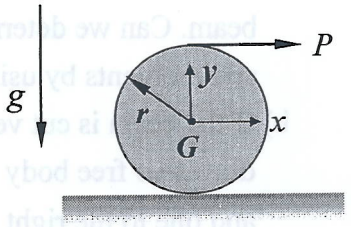

Figure 4