

國立中央大學八十八學年度碩士班研究生入學試題卷

所別： 應用地質研究所 不分組 科目： 工程力學 共 1 頁 第 1 頁

1. A composite beam is constructed of a wood beam 15cm wide and 20 cm deep reinforced on the lower side by a 15cm*1 cm steel plate. The modulus of elasticity for wood is $E_w=10,000\text{MPa}$ and for steel is $E_s=200,000\text{MPa}$. Find the allowable bending moment for the beam if the allowable stress in the wood is $\sigma_w=8\text{MPa}$ and in the steel $\sigma_s=120\text{MPa}$. (25 分)
2. Find the strain state (ϵ_x , ϵ_y , γ_{xy}) for the element as shown in Fig. 1, and find the principal strains ϵ_1 , ϵ_2 and their direction. (30 分)
3. A 20m circular arch as shown in Fig. 2 must withstand a wind load given for $0 < \theta < \pi/2$ as $f = 5000(1 - \frac{\theta}{\pi/2})$ N/m, where θ is measured in radians. Note that for $\theta > \pi/2$, there is no loading. What are the supporting forces? (25 分)
4. A cylinder with a mass of 25 kg is released from rest on an incline, as shown in Fig. 3. The diameter of the cylinder is 0.6m. If the cylinder rolls without slipping; compute the speed of the centerline C after it has moved 1.6m along the incline. Also, ascertain the friction force acting on the cylinder. Note that the kinetic energy of a cylinder rotating about its own stationary axis is $0.25MR^2\omega^2$, where ω is the angular speed in rad /sec. (20 分)

參考用

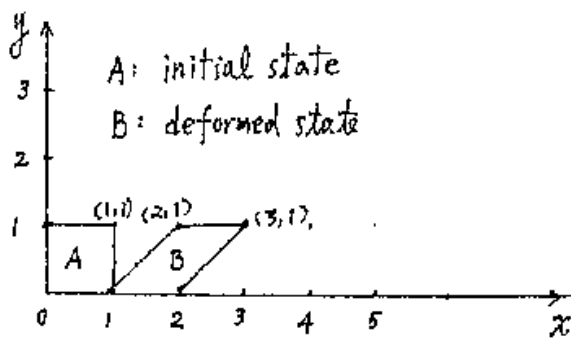


Fig. 1

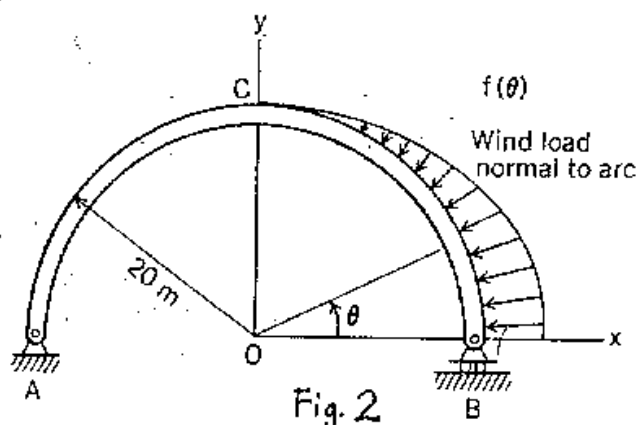


Fig. 2

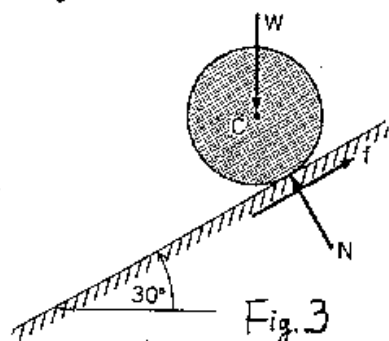


Fig. 3