

國立彰化師範大學 100 學年度碩士班招生考試試題

系所：工業教育與技術學系 組別：乙組 科目：工程力學(含應用力學及材料力學)

☆☆請在答案紙上作答☆☆

共 2 頁，第 1 頁

1. Please explain or define the following terms: (20%)
 - (1) Virtual work
 - (2) D'Alembert's principle
 - (3) Zero-force member
 - (4) Non-conservative force
 - (5) Statically indeterminate problems
2. Which of the following statements about the impact problem is wrong? (10%)
 - (a) There is a mass dependent velocity change in the direction perpendicular to the line of impact.
 - (b) Linear momentum is conserved for the direct central impact.
 - (c) If the impact involves rotational motion, then the angular momentum of the system about the center of mass of the rotating body is not conserved.
 - (d) The coefficient of restitution "e" is a measurement of the elasticity of impact. If $e=0$, the impact is elastic and there is no loss of kinetic energy.
3. A system is shown in Fig. 1. AB axis coincides with the y axis. Given that bar CD rotates about axis AB at angular velocity $10\bar{j}$ (y axis), bar DE rotates relative to CD at angular velocity of $5\bar{i}$ (x axis), and EF relative to DE at $20\bar{k}$ (z axis), what is the absolute velocity of point F for the configuration shown? (20%)

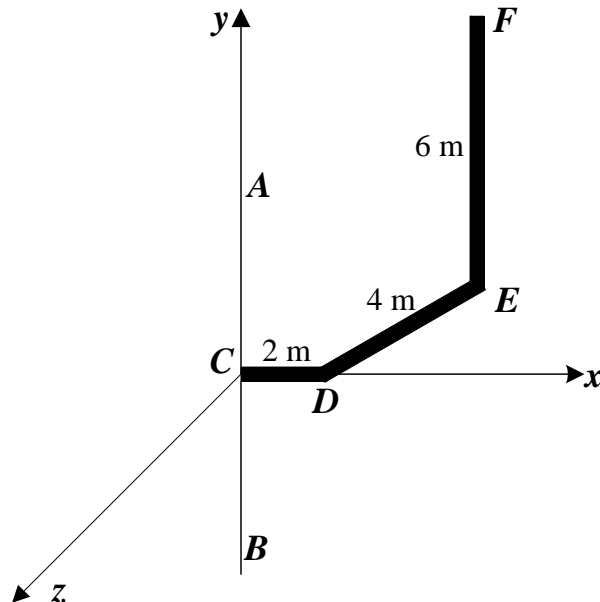


Fig. 1

國立彰化師範大學 100 學年度碩士班招生考試試題

系所：工業教育與技術學系 組別：乙組 科目：工程力學(含應用力學及材料力學)

☆☆請在答案紙上作答☆☆

共 2 頁，第 2 頁

4. Two gage marks are placed 300 mm apart on a 14-mm-diameter aluminum rod with $E = 72.5 \text{ GPa}$ and an ultimate strength of 150 MPa. Knowing that the distance between the gage marks is 300.25 mm after loading, determine (1) the stress in the rod, (2) the factor of safety. (25%)

5. A solid steel shaft with a length of 3 m is to transmit 9 kW at a frequency of 30 Hz. Determine the required diameter of the shaft, knowing that $G = 75 \text{ GPa}$, that the allowable shearing stress is 35 MPa, and that the angle of twist must not exceed 3° . (25%)