編號： 117

國立成功大學 108 學年度碩士班招生考試試題

系　　所：工程科學系

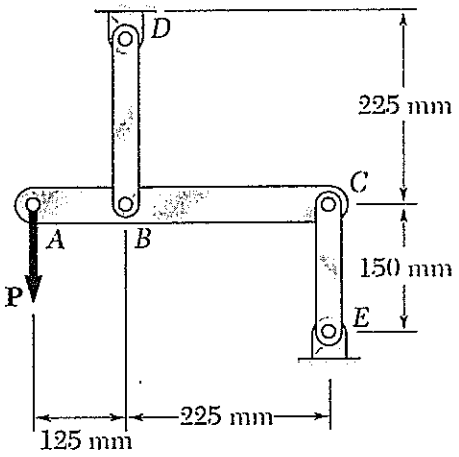
考試科目：材料力學

考試日期：0224，節次：2

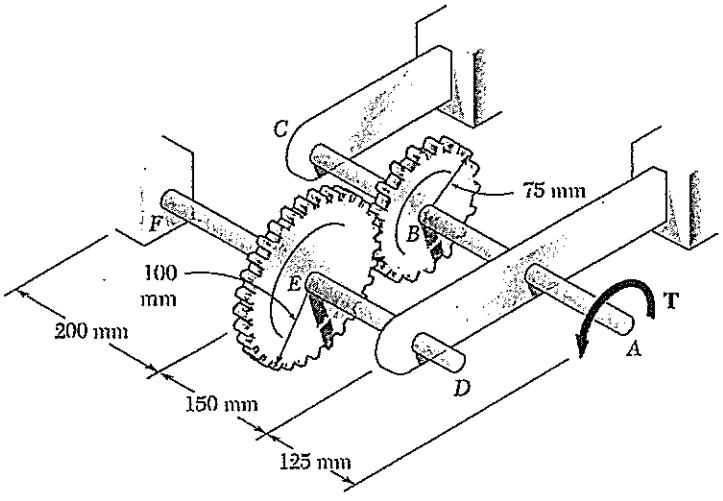
※ 考生請注意：本試題可使用計算機。　請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

1. (20pts) Explain the following terms:
   (a) factor of safety, (b) percent elongation, (c) dilatation, (d) plane strain, (e) three-point bending, (f) statically indeterminate beam, (g) idealized elastoplastic material, (h) maximum-shear-stress yield criterion, (i) unsymmetrical bending, (j) Euler's formula for pin-ended column.

2. (20pts) Link *BD* is made of brass (E = 103 GPa) and has a cross-sectional area of 258 mm^2. Link *CE* is made of aluminum (E = 72 GPa) and has a cross-sectional area of 322 mm^2. Determine the maximum force **P** that can be applied vertically at point *A* if the deflection of *A* is not to exceed 0.35 mm.



3. (20pts) Two shafts, each of 20 mm diameter, are connected by the gears shown. Knowing that G = 77 GPa and that the shaft at *F* is fixed, determine the angle through which end *A* rotates when a T = 85 N·m torque is applied at *A*.



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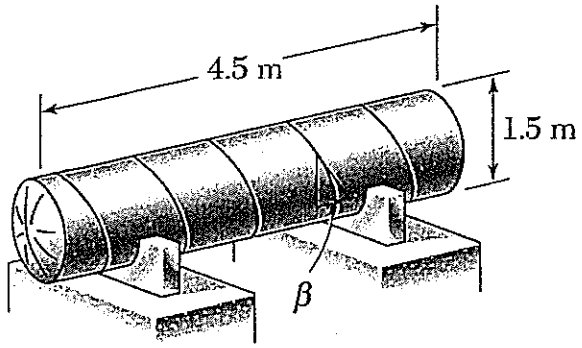
4. (20pts) The pressure tank shown has a 10 mm wall thickness and butt-welded seams forming an angle β with a transverse plane. Determine the range of values of β that can be used if the shearing stress parallel to the weld is not to exceed 9 MPa when the gage pressure is 580 kPa.



5. (20pts) Determine the reaction at the roller support and draw the bending moment diagram for the beam and loading shown.