3. The state of stress in a point of material is shown in Fig.3. Determine the direction and magnitudes of the principal stresses. (25%)

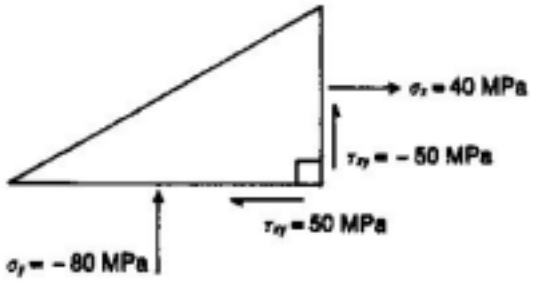

Fig.3 Stress acting at a point

4. The beam shown in Fig.4 is fixed at one end and loaded at the other end with a transverse load ***P*** and a torque ***T***. Neglecting the inaccuracies in the stress formulations at the support end, determine the state of stress at point ***A***, ***B***, ***C***, and ***D***. [$I_z = \pi d^4/64$] (25%)

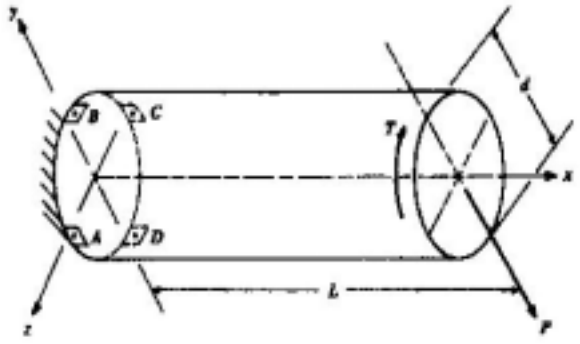

Fig.4

共2頁 1

國立中正大學九十學年度碩士班招生考試試題

系所別：機電光整合工程研究所　　科　目：材料力學

1. The rod shown in figure 1 has cross-sectional area of 40 m^2. It is attached to the fixed wall at A, and before it is loaded there is a gap between the wall at B and the rod 0.001 m.
   (a) Determine the reactions at A and B if the rod is subjected to an axial force of P = 70 kN at C as shown, the elastic modulus of the rod is E = 100 kpa.
   (b) Determine the maximum force of P so that the rod did not contact with wall at B.

   (25 %)

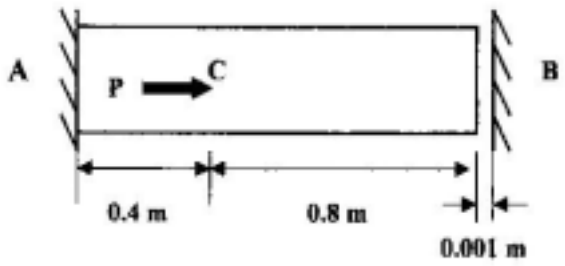

Figure 1.

2. The beam is made of a material having an allowable bending stress of $(\sigma_{allow})_C$ = 5 kpa in compression and $(\sigma_{allow})_t$ = 15 kpa in tension. The cross section of the beam is a T type with the moment of inertia I = 2/3 m^4 and the centroid of cross section C shown in figure2.
   (a) Determine the magnitude of the maximum loads P that can be applied to the beam.
   (b) Calculate the maximum tensile stress and the maximum compressive stress on the cross section, also plot the bending stress distribution on this cross section.

   (25 %)

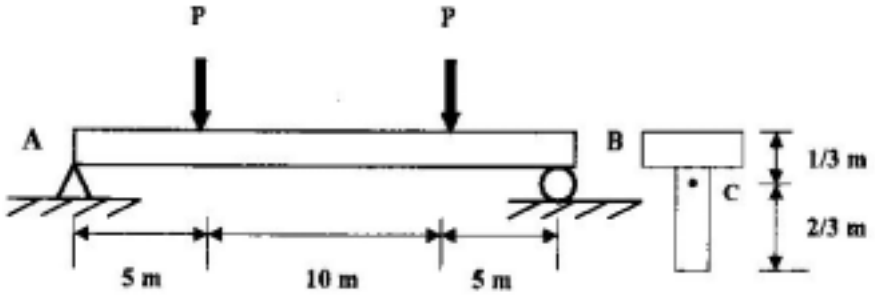

Figure 2