1. (30%) For the rigid body carrying the loads shown in Fig. P1, determine (a) the tension $T_{EF}$ in the cable $EF$, (b) the reaction force $A$ and the reaction moment $M_A$ at the universal joint support $A$.

2. (30%) The centroid of the shaded area shown in Fig. P2 is at $(x, y)$. Determine (a) the moments of inertia $I_y$, (b) the radius of gyration $k_y$, (c) the abscissa $x$ of $C$, (d) the centroidal moment of inertia $I'$, (e) the moments of inertia $I_x$.

3. (5% each) Circle on this test sheet the correct or nearest item for each of the following:

   A. The centroid of the shaded composite area shown is at $(x, y)$. If $r = 3.4$ m, the value of $x$ is
      (a) 0.461 m.  (b) 0.439 m.  (c) 0.417 m.  (d) 0.396 m.  (e) 0.374 m.  (f) 0.352 m.  (g) 0.330 m.
   B. The centroid of the shaded composite area shown is at $(x, y)$. If $r = 3.4$ m, the value of $y$ is
      (a) 4.89 m.  (b) 4.68 m.  (c) 4.47 m.  (d) 4.25 m.  (e) 4.04 m.  (f) 3.83 m.  (g) 3.62 m.
   C. A truss is shown, where $P = 32$ kN and $Q = 3$ kN. The magnitude of $F_{AB}$ in member $AB$ is
      (a) 21.0 kN.  (b) 22.9 kN.  (c) 24.8 kN.  (d) 26.7 kN.  (e) 28.6 kN.  (f) 30.5 kN.  (g) 32.4 kN.
   D. A truss is shown, where $P = 32$ kN and $Q = 3$ kN. The magnitude of $F_{FG}$ in member $FG$ is
      (a) 7.61 kN.  (b) 7.06 kN.  (c) 6.50 kN.  (d) 5.94 kN.  (e) 5.39 kN.  (f) 4.83 kN.  (g) 4.27 kN.

4. (5% each) Non-numerical problem.
   A. Describe the parallel-axis theorem for area moments of inertia and include a sketch to illustrate it.
   B. Define a simple truss and include a sketch to illustrate such a truss with loads and supports.
   C. Define a compound truss and include a sketch to illustrate such a truss with loads and supports.
   D. Define a complex truss and include a sketch to illustrate such a truss with loads and supports.