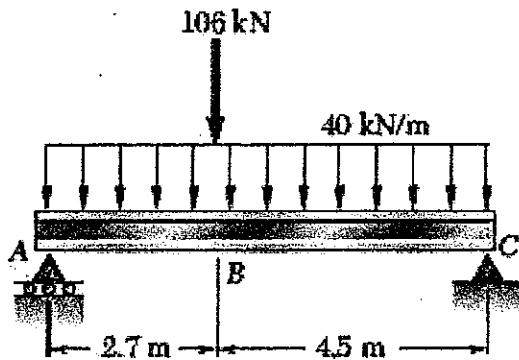


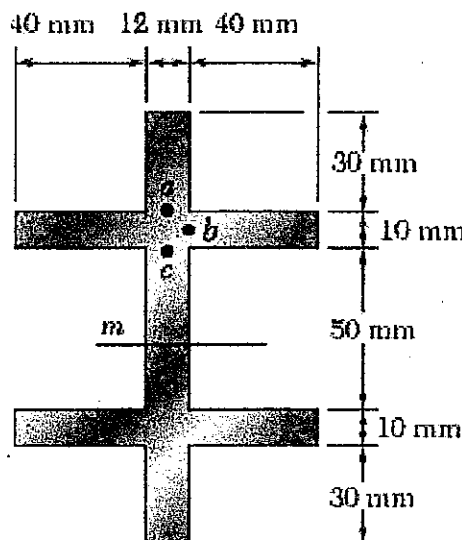
※ 考生請注意：本試題不可使用計算機。請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

1. (20pts) Explain the following terms:  
 (a) 0.2% offset yield stress, (b) ductility, (c) strain hardening, (d) anisotropic material, (e) shear strain, (f) gage length, (g) plastic section modulus, (h) endurance limit, (i) method of superposition, (j) method of transformed section.
2. (10pts) Prove the relationship  $G = E / 2(1+\nu)$  where  $E$  is the modulus of elasticity,  $\nu$  is the Poisson's ratio, and  $G$  is the shear modulus.
3. (20pts) Knowing that the allowable normal stress for steel used is 165 MPa, select the most economical wide-flange beam to support the loading shown.

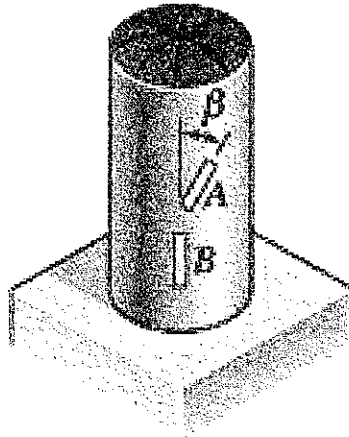


Shape	$S \times 10^3 \text{ mm}^3$
W 760 × 147	4410
W 690 × 125	3510
W 610 × 155	4220
W 530 × 150	3720
W 460 × 158	3340

4. (20pts) Knowing that a given vertical shear  $V$  causes a maximum shear stress of 50 MPa in a thin-walled member having the cross section shown, determine the corresponding shear stress (a) at point  $a$ , (b) at point  $b$ , (c) at point  $c$ .



5. (20pts) A strain gage  $A$  forming an angle  $\beta = 30^\circ$  with the vertical is used to determine the gage pressure in the cylindrical steel tank shown. The cylindrical wall of the tank is 10 mm thick, has a 900 mm inner diameter, and is made of a steel with  $E = 200$  GPa and  $\nu = 0.30$ . Determine the pressure in the tank corresponding to a gage reading of  $220 \times 10^{-6}$  mm/mm ( $\cos 30^\circ = 0.866$  and  $\cos 60^\circ = 0.5$ ).



6. (10pts) Determine the reaction at  $A$  and draw the bending moment diagram for the beam and loading

