Jordan University / Industrial Eng. Dept.
2nd Manufacturing quiz 28/11/2012

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Q1). In a stress relaxation experiment, a cylinder of material is instantaneously stretched from length Lo to length Lf and held at Lf for 10 minutes. . Sketch qualitatively the tensile stress as a function of time which is required to maintain this deformation for:
a) An elastic solid; b) a Viscoelastic solid; and c) a Newtonian liquid

Elastic
deformation

Q2) Newtonian fluid material is a material whereby:
a) Viscosity change with increasing shear stress
b) Viscosity is do not change with changing shear stress.
c) Fluidity dependent on shear stress
d) Fluidity is independent of shear stress
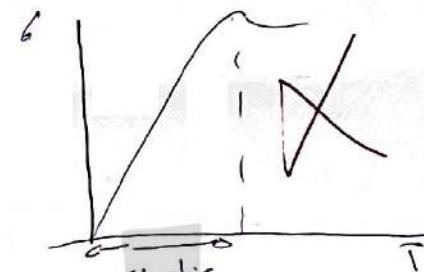
Q3) Solidification shrinkage in Fe- alloy is due to 2 factors; those are
a) due to ....cooling....rate......................................
b) due to ....

→ quantity of the molten material that we have pouring it into the mold by the rizer

Q4) Name the two basic mold types that distinguish casting processes
a) non-permenent types (sand casting mold).
b) Permenent mold (steel molds)

Q5) In a casting process grain structure differs from pure metal to an alloying materials , so that during casting:
a) Pure metal shows a randomly oriented small grain near the mold wall and large columnar grain oriented toward the casting center
b) Pure metal shows a randomly oriented large grain near the mold wall and large columnar grain oriented toward the casting center
c) Pure metal shows a randomly oriented small grain near the mold wall and grain segregation in the center of casting
d) Pure metal shows a randomly oriented small grain near the mold wall and large columnar grain casting center

Q6) In Direction solidification its refers to :
a) The important that regions of casting far away from raiser should frees first
b) The raiser Aspect ratio should big enough so that molten material will have time to compensate shrinkage in the part
c) The micro structure of molding will have a nodular shape
d) Is termed as to describe a heterogeneous solidification process

Q7) In centrifugal casting the so called GF (G Factor) relates the :
a) Centrifugal force /weight   b) Centrifugal force /volume
c) Centrifugal force /speed

Q8) In Sand casting mold the V/A ratio of the raiser ~~Centrifugal force /weight should be~~ ~~designed to have~~

A) equal to   greater than

(b) Smaller than   " the volume of the casting itself"

Q9) Carbon concentration in steel is equal to % .....5.....%.....

Q10) In casting experiments performed using a certain alloy and type of sand mold, it took 155 sec for a cube-shaped casting to solidify. The cube was 50 mm on a side.
(a) Determine the value of the mold constant in Chvorinov's rule Cm
(b) If the same alloy and mold type were used, find the total solidification time for a cylindrical casting in which the diameter = 30 mm and length = 50 mm.

Useful Equations: $T_{Ts} = Cm \, (V/A)^n$

Good Luck
Each quiz contribute 2. 5 Marks

$\frac{1}{2}$ open

[a]

For Cube:
$V:$ Volume $= 50 \times 50 \times 50 = 1.25 \times 10^{-4}$ m.

$A:$ Surface area $= 6 \times 50 \times 50 = $ ~~0.015~~ m.
6.0125

$\boxed{n = 2}$

$Cm = \dfrac{T_{Ts}}{(V/A)^n} = \dfrac{155}{\left(\dfrac{1.25\times10^{-4}}{0.0125}\right)^2} = \dfrac{1550000}{\text{~~2925000~~}}$ s/m^3

$= $ ~~4200~~ $\left(\text{min}/m^3\right)$
23853

[b] $V_{cy} = \left(\dfrac{\pi}{4} \partial^2\right) h = 3.53 \times 10^{-5}$ m.

$A = \pi \partial h = 4.71 \times 10^{-3}$ m.
$n = 2$

$T_{Ts} = Cm \, (V/A)^n$

$= \text{~~1550000~~} \left(\dfrac{3.53\times10^{-5}}{4.71\times10^{-3}}\right)^2$

$= 87.06$ sec.