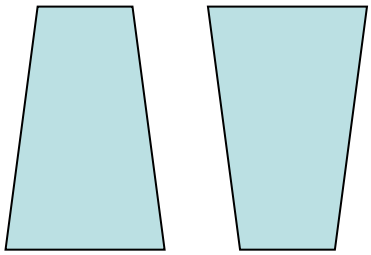
# TA201: Introduction to Manufacturing Processes

Home Assignment # 1

*(Submission Due on 8 Oct 2020 latest by 6:00 PM)*

**1**. Draw a well-labelled schematic microstructure of single crystal, columnar grain, equiaxed and dendritic grains.

**2.** Figure below shows the front view of two ingots 'X' and 'Y'. Both have the same volume and are fabricated by sand mould casting. If both ingots exhibit piping, show the schematic cross-sectional view (front view) of the ingot.



**(X)** **(Y)**

**3.** What is a *sprue* and why is it made tapered? Briefly describe the function of the following during casting operation:

(a) vent holes
(b) core

**4.** Using well-labeled schematic drawings, describe the following:
(a) Investment Casting or Lost-Wax Process (b) Slip Casting (c) Centrifugal Casting

**5.** List the advantages of powder metallurgical processing over other manufacturing techniques?

**6.** How can one differentiate between Fusion Welding, Soldering and Brazing?

**7.** Tick the correct option that matches the joining processes in *Group-I* with principal mechanisms in *Group-II* [5]

| **Group-I** | **Group-II** |
|---|---|
| (P) explosive welding | (1) use of non-consummable electrode |
| (Q) spot welding | (2) capillary stress |
| (R) TIG welding | (3) interfacial resistance heating |
| (S) Thermit welding | (4) interfacial deformation |
| (T) Soldering | (5) exothermic reaction |

(i) P-4, Q-1, R-5, S-3, T-2
(ii) P-5, Q-3, R-4, S-1, T-2
(iii) P-3, Q-2, R-1, S-4, T-5
(iv) P-4, Q-3, R-1, S-5, T-2
(v) P-2, Q-1, R-4, S-3, T-5

**8.** Using neat sketches, schematically show the five basic types of weld joint design.

**9.** Write the full form of the following welding processes. Of the following welding processes, which one will give the highest and least Heat-Affected Zone (HAZ) and Why:

OAW, MIG, SAW, EBW

**10.** Describe in brief Resistance Spot Welding.